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STEEL CORPORATION MANAGEMENT.

AN ARRAY OF GREAT BUSINESS NAMES—ROCKEFELLER INTERESTS VERY PROMINENT—TERMS MADE TO CONSOLIDATED IRON MINES AND AMERICAN BRIDGE.

Of all the announcements connected with the organization of the United States Steel Corporation, that of most interest to the hundreds of managers connected with constituent companies throughout the country is the list of directors and officers given out by J. P. Morgan & Co., a few days ago. It was expected that this list would probably show which of the old organizations—Carnegie, Federal Steel, Rockefeller, etc.—would be liable to have most power in the management. Such is not the case. In the executive committee, which will undoubtedly have most to do directly with the management, no particular interest predominates. It is a Morgan committee, alike to the board of directors, which does not contain a single name that has ever been connected with speculation; on the contrary the board represents the strongest array of solid business men the world has ever seen. The list of directors and officers is as follows:

Directors—J. Pierpont Morgan, John D. Rockefeller, Francis H. Peabody, Henry H. Rogers, Charles M. Schwab, Elbert H. Gary, Robert Bacon, Charles Steele, Marshall Field, Norman B. Ream, P. A. B. Widener, William H. Moore, James H. Reed, Henry C. Frick, Daniel G. Reid, E. C. Converse, Percival Roberts, John D. Rockefeller, Jr., Alfred Clifford, William E. Dodge, Nathaniel Thayer, William Edenborn, Abram S. Hewitt and Clement A. Griscom.

President, Charles M. Schwab; treasurer, Arthur F. Luke; secretary, Richard Trimble.

Executive Committee—E. H. Gary, chairman; Daniel G. Reid, William Edenborn, E. C. Converse, Percival Roberts, Charles Steele.

Finance Committee—Robert Bacon, chairman; Henry H. Rogers, Norman P. Ream, P. A. B. Widener.

In addition to Mr. Morgan himself, two of his business partners, Robert Bacon and Charles Steele are on the board of directors, and the Rockefeller interest in the board is also strong as it includes John D. Rockefeller, John D. Rockefeller, Jr., and Henry H. Rogers, with Mr. Rogers also on the finance committee. Of the executive committee, E. H. Gary is president of the Federal Steel Co.; E. C. Converse is president of the National Tube Co.; Percival Roberts is a director of the American Bridge Co.; Charles Steele is a partner of Mr. Morgan; Daniel G. Reid is a representative of the National Steel and other interests of the Moores, and Wm. Edenborn had been prominently connected with American Steel & Wire. Henry C. Frick, it is understood, takes a place on the board of directors at the personal request of Mr. Morgan. Judge Gary, by virtue of his office as chairman of the executive committee, will be, next to Mr. Schwab, the executive head of the company. Richard Trimble, secretary, was secretary and treasurer of Federal Steel, and Arthur F. Luke, treasurer, was treasurer of National Tube.

Treated as individuals this group of men is fascinating. John D. Rockefeller, whose vast wealth has made this great corporation possible, started in life as a bookkeeper in Cleveland. H. H. Rogers was a workman in an oil refinery and was employed by the South Improvement Co. which was the forerunner of the present Standard Oil Co. Charles M. Schwab, as late as twenty years ago, was a stake driver for the Carnegie Co. These men have all come up from the ranks. They started in life without a dollar. In fact only one of them is of the purple and that is J. Pierpont Morgan himself.

In connection with the publication of names of directors and officers came an official announcement regarding increase of capital and the purchase of Lake Superior Consolidated Iron Mines and the American Bridge Co. The capital has been increased to $550,000,000 preferred and $550,000,000 common, a total of $1,100,000,000. The corporation has also arranged to acquire all the outstanding interest in the Oliver Iron Mining Co. and the Pittsburg Steamship Co. not owned by the Carnegie company. The bridge company, which has a capitalization of $70,000,000 equally divided between 7 per cent. cumulative preferred and common, goes in upon a basis of 110 for preferred and 105 for common. The lake region, however, is principally concerned over the manner in which Lake Superior Consolidated has fared; and it has certainly gone in upon a basis which justified the unusual activity in its stock during the past two weeks. The capital stock of the Lake Superior Consolidated is $30,000,000. Holders of this stock will receive for each share of it $135 in preferred stock and $135 in common stock of the United States Steel Corporation. It therefore enters the corporation at a higher valuation than any of the constituent companies and makes Mr. Rockefeller's holdings of stock in the corporation greater than that of any other man and his actual investment next to that of Mr. Carnegie. The history of Lake Superior Consolidated has been in its way as phenomenal as that of Standard Oil. A few years ago it could have been purchased at $10 a share. It is announced that 85 per cent. of the Lake Superior Consolidated stock has been deposited for exchange into United States steel securities which, the circular adds, embraces the holdings of Mr. Rockefeller.

The list of officers and directors given out by Morgan & Co. was the strongest announcement connected with all the plans of the organization. It was evident from this array of great business names that the corporation has as its guiding spirit a man who can properly be regarded as the most capable and most complete man of his time. Mr. Morgan has given abundant evidence of wisdom. He is not only courageous, but wise. Many men are clever, and even brilliant, but are lacking in the saving quality of wisdom. The settlement of the recent labor troubles in Pennsylvania by Mr. Morgan was the act of a man of the most far seeing wisdom. That same tact and rare judgment which he has shown in handling the coal troubles will doubtless be exercised in the management of the great steel company. The corporation will doubtless be managed upon a broad minded basis, will not endeavor to squeeze the consumer or to change the price of its products merely to manipulate the market, for no man understands the jealous nature of the American people regarding corporate power more than Mr. Morgan himself. He is really a distinguished statesman who has devoted his time to business. It would not be surprising to see United States Steel Corporation securities very much higher in the market in the near future. It is said that the managers of the corporation expect that the earnings of the Carnegie plant alone will take care of the interest on the bonds and the dividend on the preferred stock. Speculation has so far concerned itself with the preferred stock, but the fluctuations in the future are likely to be less and less on the preferred and more on the common stock. Dividends on the preferred stock are limited, while on the common stock they are unlimited. It is thought the prefered stock will soon sell materially above par.

LITTLE PREPARATION FOR LAKE NAVIGATION.

Two or three owners of large fleets of vessels in Cleveland who have no connection with any of the steel interests are planning for a meeting in Cleveland on Wednesday of next week, when it is proposed to have all, or the greater part, of the so-called individual vessel owners of the lakes enter into an agreement to take no iron ore at less than 90 cents from the head of Lake Superior, 80 from Marquette or 70 cents from Escanaba, and no coal for either Lake Superior or Lake Michigan at less than 50 cents. The leaders in the movement seem quite in earnest. They say that with not more than a dozen of the principal owners standing together on such a proposition they will be successful. As there is no business of any kind offered as yet it is not known what the proposed scheme may amount to, but it is quite evident that unless something of the kind is done ships will be carrying freight when the season begins at rates probably lower than have ever been known on the lakes. This will be due, of course, to the great surplus of vessel capacity. Prices of ore have not been fixed, on account of the uncertainty regarding plans of the United Steel Corporation. For the same reason practically nothing is being done towards starting the ore carrying fleets of the steel companies. It is now the general opinion, however, that no change will be made in the management of these vessels for the present season. In a few cases a move has been made towards starting engineers to work on the vessels. All that has been done on this score seems to indicate a struggle between the organization of engineers and the vessel men. The latter are, without doubt, unanimous in their determination to get engineers wherever they can rather than give recognition to the organization.

Mr. George Uhler, the national president of the engineers, who was in Cleveland for a few days during the present week, insists that the engineers have made no demand upon the carriers. All that has been done so far, he says, has been in the nature of a request. "Year after year," said he, "the executive committee of the Lake Carriers' Association drew up a schedule of wages for the engineers, which schedule became the ruling schedule, not only for the vessels in the Lake Carriers' Association, but for those outside of it. This year the lake engineers drew up their own schedule and classification and submitted it to the convention, which approved it. It was given to me to submit to the Lake Carriers' Association, which I did, with a request that it be given consideration. Mr. Corrigan of the executive committee has replied that he does not know when the request will be given consideration. And there the matter rests. It was so a month ago and it is the same today."

Mr. Uhler says that there is no substantial difference between the schedule submitted by the engineers and that paid by the carriers. The main point of difference is that an extra engineer is wanted upon vessels that are equipped with water-tube boilers, because extra work is required upon these vessels. Regarding the new classification of vessels he says that fully as many vessels will pass from the first to the second class as will pass from the second to the first class. He says also that the engineers who will lose by the new classification have accepted the prospect of reduction without a murmur. The engineers are quite determined, he adds, and will not alter their stand until they hear from the carriers. When it was called to his attention that certain of the engineers in dealing with the owners had requested them to withdraw from the Lake Carriers' Association, he said that no engineers had been instructed to make such a request, but that an engineer, knowing that the Lake Carriers' Association had not acted upon the request of the engineers, had probably dealt with the owner on that score as an individual.

Thus it would seem, from a disinterested standpoint, that with recognition of the organization of engineers on the part of the ship owners there would be little difficulty in arriving at a settlement, but from the present outlook it is more than probable that there will be no recognition unless the engineers succeed in forcing it by the struggle that is now on.

Every vessel master who has been on Lake Michigan during the past two years knows of the dangers of navigation in the vicinity of Gray's reef on account of numerous shoals, some of them discovered only recently by the deep-draught freighters. This passage was surveyed last fall by officers of the U. S. S. Michigan, and the United States hydrographic office has just issued a special chart showing results of the survey. The chart shows where the Minnesota liner Malietoa found bottom and takes in Vienna shoal, middle shoal and all other shallow places in the vicinity. In order to place it within reach of everybody wanting it, it is to sell at 10 cents and may be had from the Marine Review (15 cents by mail) as soon as locations of light-ships, buoys, etc., in the Straits for the coming year are definitely determined.

Mr. J. Pierpont Morgan left for England on Tuesday.

SHIP BUILDING OUTLOOK ON THE CLYDE.

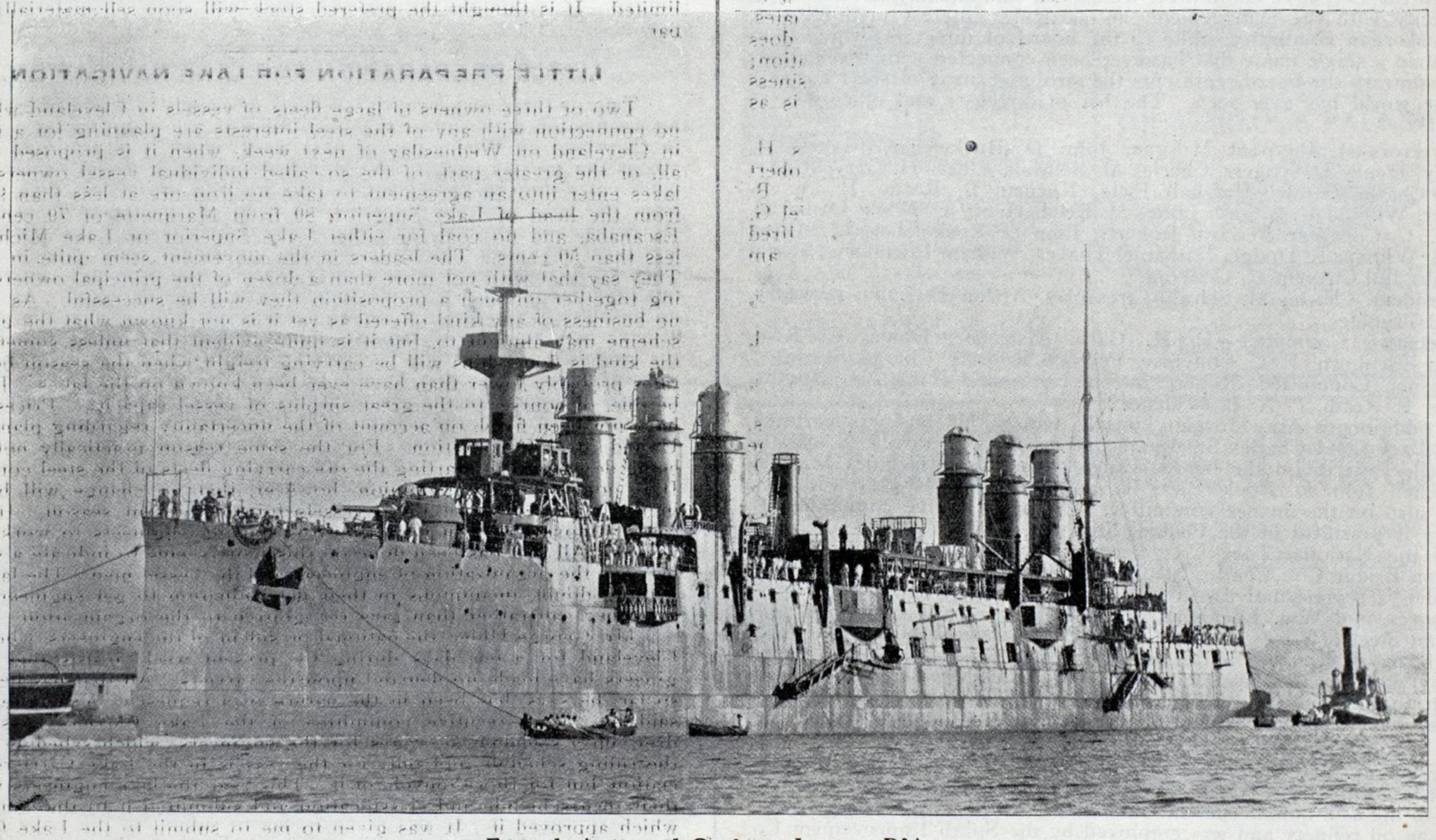
NUMBER OF ORDERS FOR NEW SHIPS NOT ENCOURAGING—REGULAR LETTER DEALING WITH OPERATIONS IN THE SCOTCH YARDS.

[Special correspondence to the Marine Review.]

Glasgow, March 26.—There is still a scarcity of new orders for ships—indeed, since March set in one has heard of hardly any contracts of any sort having been booked by our ship builders. And that is all the more remarkable because ship plates, as well as coal, are now very much cheaper than when the last little spurt of buying set in. For instance, best steel ship plates are now being offered at £6 2s. 6d. per ton less 5 per cent., delivered Clyde, which is even lower than the quotations we hear of in the north of England. Of course, it is still a good bit above £4 10s., which was the rate about four years ago, and wages are considerably higher now than then. Still, ships can now be built for a good deal less money than last year and the wonder is that owners do not buy. The reasons for delay are the depression in the freight market and the uncertainty of the political outlook.

In the absence of new orders for merchant vessels to replace contracts that are being finished off, the Clyde is naturally much interested in the new admiralty programme. This includes a battleship, seven cruisers, ten destroyers, and a number of torpedo boats, etc., to be built on contract in private yards, besides what is to be built in the government dock yards, and a considerable share in these contracts is anticipated by the Clyde ship builders on the admiralty list. Others are hoping to get placed on the list and to have an opportunity of tendering. These new contracts are to be allotted during the financial year upon which we are just entering, but not much actual work will be done on them until next year. On the other hand, the work already on hand with contractors is to be pushed ahead, and for that purpose a sum of 8½ millions sterling has been voted. Of that sum about 2¼ millions will go to Clyde ship builders, who have more work on hand just now for the navy than the builders of any other part of the country. For several years the government has spent about two millions per annum in the ship yards here and they might spend more with advantage, for a Clyde ship builder can turn out a first-class battleship or an armored cruiser in much less time than one of the government dock yards can do; provided, of course, there is no labor trouble with the men and that the armor is forthcoming in time. The delays with contract vessels last year were chiefly due to the admiralty requiring precedence for orders for armor plates to be given to those sent from the dock yards. But there is now plenty of armor plate plant to keep both the dock yards and the private yards going. There are now five producers of armor plates and each one of them can increase his output if he gets timely notice of what may be wanted in the not very dim and distant future. The armor plates now used cost about 20 per cent. more than those in use ten years ago—an enormous addition to the cost of the modern fighting machine.

Of great interest to ship builders is the interim report of the committee on water tube boilers appointed last year by the first lord of the admiralty. This committee's report is adverse to the Belleville boiler, which they do not consider to have any such advantages over other types of water tube boilers as to warrant them in recommending it for adoption in the navy. Among the defects of the Belleville boiler they enumerate uncertain circulation resulting from the resistance offered by the great length of tube between the feed and steam collectors; the friction of the junction boxes and the small holes in the nipples between the feed collector and the generator tube; the delicate and complicated feeding apparatus; the great excess of pressure in the feed water pipes; the excess of boiler pressure over the working pressure of the engines; the defective water gauging which has led to serious accidents; the varying quantity of water in the boiler at different rates of combustion; the necessity of separation with automatic blow-out valves on the steam pipes; the constant trouble and loss of water resulting from the nickel sleeve joints connecting the elements to the feed collectors; and the liability of tubes to fail by pitting or corrosion. There are other objections stated, and the result of the report is that the admiralty has countermanded all orders for Belleville boilers except in the case of ships that are at such an advanced stage of construction that a change of steam generators would mean a very serious delay. This alteration of plan will involve the modification of the specifications of quite a number of the government contracts already placed with private builders. The committee, however, while condemning the Belleville boiler do not specifically recommend the adoption of any other type in its place. Their investigation is not yet completed, and they want a thorough test to be made with the Babcock & Wilcox and the Niclausse boilers, which are now being fitted on a couple of cruisers and sloops. They also ask that the cylindrical boilers be taken out of a couple of elderly cruisers and Dur and Yarrow boilers be fitted in their place for a year's practical trial of these types. The committee are strictly of the opinion that "for naval purposes and from the military point of view," the water tube boiler is preferable to the cylindrical. But it remains to be settled yet which is the best type of water tube boiler to adopt. The advocates of the large tube types are, of course, jubilant over this report.



French Armored Cruiser Jeanne D'Arc.

The new French armored cruiser Jeanne D'Arc is the very latest continental type of so-called commerce destroyer. She embodies the latest ideas of French naval construction in regard to this type of vessel. With her six funnels she certainly presents a very strange appearance. She is as fast as an ocean liner.

It is said that the amount of royalty payable on the Belleville boiler to the French patentees is 22 francs per square metre of heating surface, which works out about $1 per I.H.P. On four ships recently launched for the British navy the royalty fees came to £17,000, on six others to £3,500 each and on the Mighty, 14,000-ton cruiser of 3,000 I.H.P., the royalty comes close upon £6,000. In the new admiralty program are five submarine boats which may be described roughly as improved Hollands. These are being built at the Barrow yard of Vickers Sons & Maxim, Ltd., and will be completed, ready for trial, in the course of the summer. Each is about 60 ft. long, is nearly circular in form, and will be propelled on the surface by 50 H.P. gasoline engines at a speed of 10 knots and under water by 50 H.P. electric motors at a speed of 7 knots. Each will have a dynamo for charging the batteries, and this can be driven by the gasoline engine. Each boat will have a horizontal, as well as a vertical rudder, the design being to dive not to sink on an even keel. The cost is about £50,000 per boat, and quite a number of interesting experiments will be made with the novel little fleet next autumn. It is, I believe, Mr. Holland's own experience that the best way of sinking a submarine boat is not on an even keel, but by an oblique plunge.

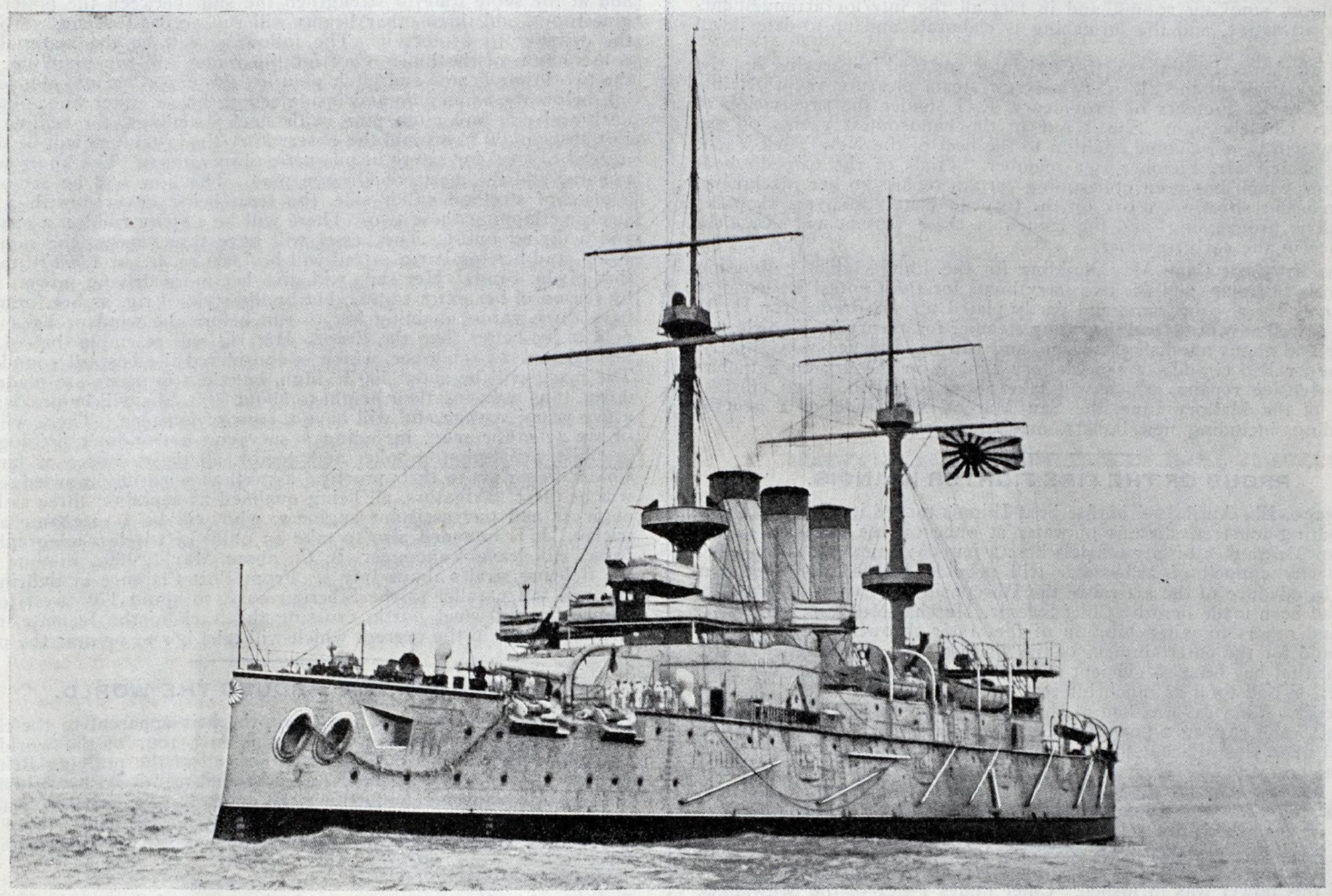
Speaking of novelties, great progress is being made with the turbine steamer which Wm. Denny & Bros. are building at Dumbarton, as mentioned in a previous communication. This vessel has beautiful lines and will combine grace of appearance with strength and speed. Forward she is of a rather straight model. In the arrangement of the screws, the center one is placed pretty much as in a single screw boat, while the side screws are arranged just as in a twin screw boat. The rudder arrangement is very much like that of a torpedo boat destroyer.

Although no date has as yet been set for the launch of the battleship Maine, now in process of construction at the works of the Cramps', Philadelphia, it will take place in a few weeks. The outside work on the hull is nearly finished.

JAPANESE BATTLESHIP HATSUSE.

The first-class Japanese battleship Hatsuse, recently constructed by Sir W. G. Armstrong, Whitworth & Co., Newcastle-on-Tyne, is credited with being the most powerful warship in the world. She is 400 ft. long between perpendiculars with a beam of 76 ft. and a displacement of 15,000 tons on a draught of 27 ft. Her armament consists of four 12-in. guns, twin-mounted in barbettes on the middle line at the ends of the ship; and fourteen 6-in. guns, mounted in casemates, eight on the main deck and six on the upper deck; twenty 12-pounder guns, twelve 3-pounder guns, and four submerged 18-in. torpedo tubes. Her armor consists of a complete belt from stem to stern, 9 in. thick over the length occupied by the machinery and magazines, gradually reduced to 4 in. at the extremities. Over the central portion occupied by the machinery and magazines side armor 6 in. thick is provided above the belt to the height of the main deck, and this is carried across the ship and connected with the central barbettes, thereby forming a citadel and protecting the bases of all the guns on the main deck. The barbettes enclosing the 12-in. guns are of 14-in. armor, the casemates protecting the 6-in. guns are of 6-in. armor and the armor of the conning tower is 14 in. thick. The ship has a speed of over 19 knots an hour and is equipped with Belleville boilers of the latest type.

The Most Powerful Battleship in the World.



JAPANESE BATTLESHIP HATSUSE.

CAPT. WOLVIN'S PROPOSITION TO MONTREAL.

A dispatch from Montreal sets forth quite lucidly the purpose of the harbor commissioners to take steps to provide that port with facilities for handling the grain output of the west. It will be remembered that Mr. W. J. Conners of Buffalo endeavored to form a syndicate to provide elevators, warehouses and other facilities and deposited $50,000 as a guarantee of good faith. Mr. Conners was, however, unable to form the syndicate and nothing has been done. The commissioners have apparently awakened to the seriousness of the situation and they have decided if the Canadian government will agree and arrangements can be made with Mr. Conners to accept an offer made by Capt. Wolvin of Duluth. Capt. Wolvin was associated with Mr. Conners at the outset of the latter's undertaking, but, apparently realizing that it was doomed to failure, he withdrew. He now comes forward on his own account and undertakes to provide Montreal with all that it requires in the way of elevator and harbor facilities.

Capt. Wolvin's scheme differs essentially in some respects from that of the Conners syndicate. It is his intention to organize a joint stock company which will issue bonds to an amount sufficient to cover the construction of the work in the harbor, not exceeding in the aggregate the sum of $750,000. These bonds will be for a term of forty years, bearing interest at the rate of 4 per cent. a year, payable semi-annually. After five or ten years from the date of the bonds the company will undertake to pay off annually bonds to an amount equivalent to one-thirtieth of the total issue at par. This issue of bonds will be secured by mortgage on the works to be erected and the harbor commissioners will provide a satisfactory guarantee to secure the payment in principal and interest of these bonds. In the event of the company failing to meet the interest as it comes due and also to pay the proportionate amount of bonds maturing each year the elevating plant and other facilities will become the property of the commissioners.

The company asks for 2,670 ft. of land of the harbor on Windmill pier, one of the principal piers, upon which it undertakes to erect a first-class modern steel or combination elevator or elevators and freight houses. The company also undertakes to construct, equip and operate a fleet of transports between Port Colborne and Montreal as soon as the facilities of Port Colborne admit of their bringing large, deep draught vessels to that port. The company will erect elevators at Port Colborne, the total cost of both elevator facilities and the transport fleet being $3,500,000. If the St. Lawrence all-water route from the great lakes to Liverpool can be made a success it is expected the company will be in a position to meet its obligations. During the first year after the completion of the Port Colborne improvements the company estimates it will handle at least 100,000,000 bushels of grain or its equivalent in other freight.

Capt. Wolvin's proposal is the first practical one that has been made and as it has been accepted by the Montreal harbor board subject to the approval of the government, it is expected that something will come of it.

Another important project in connection with the development of the traffic of Canadian ports is the improvement of what is known as the French river route. The French river is the outlet of Lake Nippissing into Georgian bay. It is an important factor in the Ottawa river scheme for connecting the upper lakes with tide water by an almost direct line from the exits of Lake Superior and Lake Michigan to ocean navigation on the St. Lawrence, cutting off the detour around the western peninsula of Ontario. Aside from its part in the larger scheme the French river offers advantages that will probably before long be utilized. Statistics show that the Canada Atlantic railway system by means of its Parry Sound connection brings more grain to Montreal than has so far come by the upper river canals. The French river would afford an opportunity for establishing a second route as direct as the Parry Sound route. If improved, as the Canadian government proposes to improve it, it will give a waterway from the head of Lake Huron into Lake Nippissing, whose shores are reached by both the Grand Trunk and Canadian Pacific railways at North Bay. North Bay is about a hundred miles nearer to Montreal by rail than Buffalo is to New York and while the water distance from Chicago to North Bay is 610 miles, that from Chicago to Buffalo is 1,060 miles, so that the saving in distance is some 500 miles. From Fort William and Duluth, whose traffic comes through the Sault Ste. Marie canal, there is an equal saving in distance to Montreal as compared with New York. Practically the advantage in Montreal's favor is about one-third. At present much of the grain grown in the Canadian west finds its way to the export point by way of Buffalo. The possibilities of the French river indicate that as a mixed water and rail route it could be made to take from Buffalo much of its advantage in the matter of cheapness and expedition. Mr. Tarte, the minister of public works, under whose direction the matter will come, is disposed to push the work of improvement.

The Cunard Steamship Co. has declared a dividend of 5 per cent. with a bonus of 2 per cent.

FROM THE HARLAN & HOLLINGSWORTH WORKS.

Wilmington, Del., April 4.—The Old Dominion Steamship Co. has just placed an order with the Harlan & Hollingsworth Co. of this city for a 200-ft. freight and passenger steamer. Preparations are being made at the works of this company for the launch at noon today of the steel freight and passenger steamer Denver, building for the New York & Texas Steamship Co., known as the Mallory Line. The vessel is intended to ply between New York and Galveston and other southern ports. She will have a carrying capacity of 3,000 gross tons on 19 ft. draught. Her dimensions are: Length from after side of stem to forward side of rudder post, 368 ft.; beam, molded, 48 ft.; depth to lower deck, molded, 16 ft.; depth to main deck, molded, 26 ft.; depth to awning deck, molded, 35 ft. She is built to class 100A at Lloyds. There are three decks continuous from stem to stern, and all completely plated fore-and-aft.; six watertight bulkheads; four hatches; seven double drum winches, five for cargo and two for coaling; windlass forward on awning deck; two capstans; two steel pole masts; steel deck house; accommodations for fifty-eight first-class passengers and seventy-eight steerage passengers; an electric light plant of 3,000 candle power capacity; an evaporator and distiller of 30 tons capacity. The vessel's speed will be 16½ knots.

The motive power consists of direct acting, triple expansion engines, with three inverted cylinders of 33½, 54 and 87 in. diameter and 54 in. stroke, to be supplied with steam from four Scotch boilers of 16 ft. 3 in. diameter and 11 ft. 6 in. length; working pressure, 180 lbs. Dining hall, main saloon, smoking rooms, and in fact all the interior arrangements are very attractive, and the furnishing is elaborate and up-to-date in all respects.

The Harlan & Hollingsworth Co. is now engaged in carrying out the preliminary trials of the 212-ft. twin-screw steam pleasure yacht Alvina, built for Charles Fletcher of Providence, R. I., under the supervision of Mr. A. S. Chesebrough. She is one of the handsomest yachts on the coast and will be a welcome addition to the fleet of the New York Yacht Club, of which Mr. Fletcher is a member. Trials of the torpedo boat Stringham, which has been undergoing certain repairs to her machinery, will also occur shortly. Work on the torpedo boat destroyers Hopkins and Hull is progressing, and the launch of these vessels will doubtless take place in the early summer.

The ferry boat Cape May, building for the Philadelphia & Reading Railway, is in frame, and the two ferry boats for the Central Railroad of New Jersey are also in frame and partly plated up. A dredge for H. T. Dunbar is well advanced, and the tramp steamer for Henry T. Knowlton is in frame and about one-half plated up, and will be launched very shortly. The steamer Rio Grande of the Mallory Line is in the dry dock undergoing extensive repairs, which will take about a month, when another steamer of the Mallory Line, the San Marcos, will undergo a general overhauling, including new boilers, machinery, etc.

PROUD OF THE FIRE FIGHTER ILLINOIS.

Chicago, Ill., April 3.—The fire boat Illinois turned itself into a fountain spouting fourteen streams of water at once on the occasion of the visit from Milwaukee of city officials here a few days ago. It is expected that the city council of Milwaukee will provide $100,000 for a similar vessel. In advance of the arrival of the Wisconsin delegation all arrangements had been made here by Chief Swenie, Marshal Musham, Mr. W. J. Wood and others for an exhibition of the water throwing power of the Illinois and for the entertainment of the visitors. As the designer of the steel boat that has been so efficient in protecting property along the river front, Mr. Wood took as much interest in the exhibition as the Chicago city officials. The test was had at the north slip. Twelve leads of hose were used, each casting a powerful stream of water far up and down the river and upon the adjacent shores. In addition, standpipes were erected, one at the bow and the other at the stern of the boat, and strong pressure was put on. Fire Marshal Musham was in command of the vessel, and explained, together with Capt. Burroughs, the workings of the machinery and the means which are taken to place the boat in a position to do effective work on buildings near the river. The Illinois can throw a solid stream of water to the top of a building seven stories high, and an exhibition of this power was furnished. Chief James Foley of the Milwaukee department headed the delegation, which was composed of aldermen and city officials. They were surprised at the amount of energy the boat is capable of putting into a fire fight, and were strengthened in their purpose to get a like vessel for Milwaukee. It is more than probable that the Milwaukee boat will be modeled on the lines of the Illinois, but larger, the Chicago craft having cost $80,000. The Illinois is the pride of Chief Swenie, and he takes a delight in sending it on such errands as crushing a way through the ice for some ship which has been blocked, or quenching a dangerous fire which the city firemen are unable to reach.

After the boat had shown how much water it can cast to the top of a high building, it was directed to the Carter H. Harrison crib, and the visitors inspected the water-bound structure, with its pumping and tunnel apparatus. They were later entertained at dinner at the Pullman club. Those in the party were: James Swenie of the Chicago fire department; James Foley, chief of the Milwaukee fire department; John J. Gregory, secretary of the Milwaukee commissioners; Carl Runge, city attorney; Edward W. Schneuzel, city clerk of Milwaukee; C. J. Poetsch, chairman of the board of public works of Milwaukee; Vin J. Schoenecker, Jr., D. B. Busch and Frank Niezerowsky of the board of public works; Milwaukee aldermen F. H. Connelly, Cornelius Corcoran, Charles Cook, George B. McKinley, Louis Jenz, William Murphy, James R. Ricketson, William Zimmerman; Joshua Hodgins of Marinette, Wisconsin; W. J. Wood, naval architect and consulting engineer, of Chicago; M. H. McColin, western representative for the Eureka Fire Hose Co.; Richard Salter, representative of the Chicago Fire Hose Co., and O. T. Musham of Chicago; G. W. Porth of Milwaukee. J. F. Burnham, chairman of the Milwaukee board of fire commissions and City Comptroller J. R. Wolf were unavoidably absent but were represented by other members of the party.

The Graham & Morton Transportation Co. of Chicago has decided to name the new steamer recently purchased from the Holland-Chicago line the Puritan instead of the Ottawa.

NEXT ARCTIC EXPEDITION.

The next arctic expedition of importance will be led by Capt. Joseph Elzear Bernier of Quebec. He comes of a family which has followed the sea from father to son for 325 years. Capt. Bernier is forty-eight years of age and is of powerful physique. He has been a captain of vessels since he was seventeen years of age. Nearly all arctic explorers agree on two points—that the pole can be reached and that it is habitable. The registered temperatures taken nearest the pole are considerably higher than the Yukon where thousands live today. Interest centers in his vessel which embodies the best features of previously built ships. The vessel will be 100 ft. long on the keel, 110 ft. over all, 36 ft. beam and 18 ft. depth of hold. She will be of 100 tons net and will run under both sail and steam. Her engines will be 300 H.P., triple expansion, with boilers of 10 by 12 ft., built for 180 lbs. pressure. This will furnish 100 H.P. more than the engines of the Fram. The hull will be different in design from that of the Fram, whose stern overhung the stern-post by 13 ft. Capt. Bernier's ship will have a perpendicular double stern-post with rudder outside, so that either the rudder or propeller can be unshipped at any time. This will be a great advantage as much difficulty was encountered by the rudder and screw of the Fram getting frozen up while jammed in ice. Capt. Bernier's vessel will also have a flush deck. Her engines will also be staunchly protected. She will have three tiers of beams about her engine and boiler room. There will be three beams over the boiler, three placed side by side to carry the step of the mizzen mast, and at the same time to strengthen the ship between the boiler and engine room, and three other beams will run across the engine room over the cylinder to protect it. The following will be the materials in the construction of the hull: Oak for the frame and top planking; oak for the two lower beams and pitch pine for the upper beams; elm for planking below the water line and inside ceiling below water line; pine for the deck and elm and pitch pine, with steel fastenings, for ceiling in hold. For space of 30 ft. around the observatory the fastenings will be of copper instead of steel for safety in magnetic observations. The knees will be of tamarac and the masts of Oregon pine. The bow will be armored with a plate of steel on either side, the stem being covered with a plate of steel overlapping these two. There will be a spare rudder, a spare screw and a diving outfit. The vessel will have three masts, the same as the Fram, and her total area of sail will be 7,000 sq. ft., or 1,000 ft. more than that of the Fram. Her sails will give her more driving power, not only by reason of her extra canvas, but by the style of rig, as her foremast will have three yards, enabling her to run before the wind or back out of a field of ice better than the Fram. Her rig will resemble that of a three-masted top-sail schooner, which is considered the best all round coaster. The masts will be about 100 ft. high, but the top masts are made to take down, thus reducing their height to about 60 ft. She will be provisioned for a five years' voyage and will have a crew of fourteen. These will consist of six scientific men, including a surveyor, astronomer, geologist, biographist, artist-photographer and doctor, all these chosen as far as possible with a view to their practical as well as scientific knowledge. There will be three navigators, all being qualified as captains; three sailors, one engineer and one assistant engineer, who will be a mechanic and electrician. It is intended also to take an outfit of wireless telegraphy. The vessel will leave Vancouver, B. C., about May 1, 1902, in time to enter the Behring straits about July 1. From Port Clarence in Behring straits she will sail parallel to the Siberian coast to about 170° west longitude, thence she will steer north, crossing the track of the Jeanette, until she strikes a point in the current which will take her to or near the pole.

OPHIR'S TRIP AROUND THE WORLD.

The Duke of Cornwall and York, the heir apparent to the throne of England, with the duchess, has started on a tour of the world on the steamship Ophir. The purpose is to visit all of the outlying British possessions. The Ophir will be escorted around the world by British squadrons, each squadron relinquishing the duty of escort when it reaches the waters of another squadron. Nothing could probably more greatly exemplify Britain's far flung battle line than this. The itinerary is as follows:

LEAVE	ARRIVE
Portsmouth, March 16.	Gibraltar, March 20.
Gibraltar, March 22.	Malta, March 25.
Malta, March 27.	Port Said, March 30.
Port Said, March 31.	Suez, April 1.
Suez, April 1.	Aden, April 5.
Aden, April 6.	Colombo, April 12.
Colombo, April 16.	Singapore, April 21.
Singapore, April 23.	Melbourne, May 6.
Melbourne, May 16.	Brisbane, May 20.
Brisbane, May 25.	Sydney, May 27.
Sydney, June 6.	Auckland, June 11.
Auckland, June 16.	Wellington, June 18.
Wellington, June 21.	Lyttleton, June 22.
Lyttleton, June 24.	Dunedin, June 25.
Dunedin, June 27.	Hobart, July 2.
Hobart, July 7.	Adelaide, July 10.
Adelaide, July 15.	Fremantle, July 20.
Fremantle, July 25.	Mauritius, Aug. 5.
Mauritius, Aug. 8.	Durban, Aug. 13.
Durban, Aug. 15.	Simonstown, Aug. 17.
Cape Town, Aug. 22.	Ascension, Aug. 27.
Ascension, Aug. 31.	Off St. Vincent, Sept. 5.
St. Vincent, Sept. 5.	Halifax, Sept. 15.
Halifax, Sept. 17.	Quebec, Sept. 20.
Quebec, Oct. 17.	St. John's, Oct. 22.
St. John's, Oct. 25.	Portsmouth, Nov. 1.

A chart of Agate and Burlington bays (Two Harbors) has just been issued and may be had from the Marine Review at 20 cents. As the district covered is small, the chart is on a large scale and shows clearly all the docks at Two Harbors. It is valuable also as a chart covering a part of the north shore of Lake Superior that is most visited by the ore and coal carriers.

POSITION OF SECOND-CLASS PILOTS.

MATES HOLDING PAPERS ENDORSED "MAY TAKE CHARGE OF A WATCH AS ASSISTANT TO CAPTAIN ON STEAMERS OF ANY TONNAGE" ARE PRACTICALLY ON AN EQUAL FOOTING WITH MATES WHO HAVE FIRST CLASS LICENSES.

Some of the local officials of the steamboat inspection service on the great lakes have for a long time past been issuing second-class pilots' licenses endorsed "empowered to take charge of a watch as assistant to a first-class pilot." Men holding such licenses have on some vessels been given charge of the deck just as though they were first-class pilots, while on most of the large steamers the second mates as well as first mates are required to hold first-class papers. General Dumont of the steamboat inspection service holds that the second-class pilot possessing a license as endorsed above is empowered to take charge of a watch. One of the managers of a large fleet of lake steamers asked Capt. Geo. P. McKay of Cleveland for his opinion on the subject. Capt. McKay prepared a written opinion and then sent a copy of the letter to Gen. Dumont, chief of the steamboat inspection service. The letter is as follows:

"I have before me the letter you submit from one of your steamboat captains, and which brings up the question of liability involved in entrusting at any time the navigation of a ship of more than 100 tons burden on the great lakes to a second-class pilot. The captain to whom you refer tells you that the young man whom he would like to employ as a mate is, he thinks, thoroughly competent to act as pilot; that after seven years' experience he applied to the local inspectors at Grand Haven for first-class pilots' papers; they gave him a second-class license and made the stipulation 'may take charge of a watch on passenger, freight and towing steamer of any tonnage.' Your captain says this was done for the reason that 'it has long since been the rule of the Grand Haven office not to make the first issue of papers a first-class license, but to wait until the applicant has served a season under second-class license.' You wish to know whether your ship would be sufficiently officered if the deck were left in charge at any time to a man holding such a second-class license as that referred to above; would the ship be legally officered, even though this man was regarded as assistant to the captain and left on watch only when the ship was in open lake?

"Whatever I may say to you on this score will be simply my personal opinion, but I am pleased to have attention directed to the subject, as I understand that on many lake vessels men holding only second-class papers are permitted to take charge of a watch just as a first-class pilot would do, and that some of the local inspectors sanction this, while others hold strictly to the rule that the deck must always be in charge of a first-class pilot. We should have a clear ruling, one that could be plainly understood, on this score, and it would seem that there should be only one opinion among officials of the steamboat inspection service in the matter.

"I find that section 6 of rule 5, general rules of the United States Board of Supervising Inspectors of Steam Vessels, says: 'The navigation of every steamer above 100 tons burden shall be under the control of a first-class pilot, and every such pilot shall be limited in his license to the particular service for which he is adapted.' Then we have section 7 of the same rule 5 as follows: 'Second-class pilots may be allowed to take charge of steamers not exceeding 100 tons burden and may be authorized by the license granted to act in charge of a watch as assistant to a first-class pilot on passenger, freight and towing steamers of all tonnage. On the northwestern lakes and connecting waters any person holding a second-class pilot license may come before any local board for examination for first-class pilot license after having served one year as wheelsman, watchman, or assistant to a first-class pilot on freight, towing or passenger steamers, such service to have been within two years preceding the application of raise of grade.'

"In view of the last sentence in the foregoing section, I do not see why any applicant capable of passing the examination for first-class pilot's papers should be prevented from securing same under such a custom as that which is said to prevail in the Grand Haven office. If he applied for a first-class pilot's license he should have been granted it if competent. But the uncertain point to which your inquiry relates is in the interpretation of that part of rule 5, section 7, which refers to the holder of a second-class license acting as assistant to a first-class pilot and its evident conflict with section 6. Does this part of section 7 mean that the man with second-class papers endorsed assistant to a first-class pilot may be left entirely in charge of the deck, as we are informed is often done?

"I certainly do not agree with such interpretation of the law, although I am reliably informed that it is being interpreted in that way in practice every day and with the knowledge of some of the inspectors. I think that if a collision or other accident should happen where a second mate with second-class papers is left in charge of the deck by a captain with whom he is acting as assistant the ship would be in great danger of being held in fault in the courts. In my opinion, whatever it may be worth, the captain who has as an assistant with him on his watch a mate who has only second-class or assistant papers, whatever they may be called, takes a chance whenever he leaves the deck, no matter for what purpose. Those who construe this law differently say that though the captain may be in the fire hold he is still technically in charge. I do not agree with them. I think he might as well be off the boat. On our steamers I have always, therefore, taken the precaution of insisting that the second mates, as well as the mates, shall have first-class pilots' papers."

General Dumont's reply to the foregoing letter upholds the issuance of second-class licenses endorsed "empowered to take charge of a watch," and is as follows:

"I am in receipt of your letter of March 25 regarding the interpretation of sections 6 and 7 of rule 5, which you think are conflicting, whereas the first-named section requires every steamer above 100 tons to be under the charge of a first-class pilot, the latter section provides that 'second-class pilots may be allowed to take charge of steamers not exceeding 100 tons burden, and may be authorized by the license granted to act in charge of a watch as assistant to a first-class pilot or passenger, freight and towing steamers of all tonnage.'

"In reply to this you are informed that there is really no conflict between the two sections, the first one covering the cases of steamers of 100 tons and upwards, where only one pilot is employed, usually on steamers running on daylight routes only, whereas on vessels requiring two pilots one of them may be licensed as second-class pilot as indicated in the rule. It is the understanding of this office, however, that such second-class pilots shall have all the qualifications of first-class pilots, so far as a knowledge of the courses, shoals, rocks, lights, etc., is concerned, before he can receive a second-class license, under which he must serve a probationary term before getting a first-class one, to determine other equally essential qualifications, namely, judgment and discretion, which can only be determined by actual practice as a pilot. It has been the practice on the Atlantic and Pacific coasts ever since the steamboat laws have been in force to license first and second-class pilots on the same vessel, though there is nothing in said practice that would prohibit owners of steam vessels from requiring that both pilots shall carry first-class licenses, as you say is your practice. I do not agree with your opinion, that an accident occurring to a steamer with a second-class pilot in charge would prima facie be 'held in fault by the courts.'"

SHIP BUILDING IN THE UNITED STATES.

The bureau of navigation, treasury department, has just issued reports dealing with the construction of merchant vessels in the United States during the quarter ended March 31 and for the three quarters of the year up to that date. The treasury department year ends June 30. Vessels built in the United States during the nine months ended March 31, 1901, numbered 753 of 246,793 gross tons, indicating for the current fiscal year a probable total construction, including canal boats and other unrigged craft, of over 460,000 tons. The increase for the first three quarters of this year over the corresponding period last year has been 50,825 tons, of which 40,912 tons are credited to the great lakes.

Steel steam vessels numbered fifty-six of 128,369 tons, compared with fifty-nine of 102,322 tons for the corresponding period last year, the lake ship yards showing an increase of 33,500 tons, and the Atlantic seaboard a decrease of 13,000 tons. The Atlantic coast decline, however, will be made good by the end of the fiscal year, when several large steamers, recently launched, are numbered. The principal factors of the new tonnage are thirteen large lake steel steamers, aggregating 59,860 tons, nineteen large wooden schooners of 35,470 tons and five large steel ocean steamers of 29,683 tons, the latter for the Hawaiian trade.

Among large lake steamers in the list recently registered are the following: Wilkesbarre, 4,153 gross tons; John J. Albright, 4,805; Walter Scranton, 4,803; J. T. Hutchinson, 3,734; Neptune, 3,717; Saturn, 3,717; Northeastern, 2,157; Northman, 2,157; Northtown, 2,157; Northwestern, 2,157.

MASTERS AND ENGINEERS OF LAKE VESSELS.

Montreal Trans. Co., Jas. A. Cuttle, Mgr., Montreal, Que.: Steamers—Bannockburn, Capt. Alex. Milligan, Engineer R. Taylor; Rosemount, Capt. Jas. W. Mawdesley, Engineer A. Huff; Glengarry, Capt. Geo. Woods, Engineer I. Boyd; D. G. Thompson, Capt. James Murray, Engineer G. Henderson. Schooners—Dunmore, Capt. John Phillips; Melrose, Capt. James Kirkwood; Minnedosa, Capt. R. C. Irwin; Selkirk, Capt. M. Ackerman; Winnipeg, Capt. A. Davy.

Kelly Island Lime & Transport Co., Cleveland: Steamers—Albert Y. Gowen, Capt. Chas. Smith, Engineer Chas. C. Smith; Desmond, Capt. Alfred Dixon, Engineer David Conway; Isabella J. Boyce, Capt. G. E. Benham, Engineer Alex McLea; Alvah S. Chisholm, Jr., Capt. D. Henderson, Engineer J. Hendrick; Ohio, Capt. D. Davis, Engineer ———; Norma, Capt. W. P. Wheeler, Engineer John D. Magnussen. Schooner—Fanny Neil, Capt. W. A. Fetterly.

Chesbrough, F. B., Emerson, Mich.: Steamers—Peshtigo, Capt. W. H. Larrabee, Engineer Geo. Gourlee; Kennebec, Capt. C. M. Haight, Engineer ———.

Robinson Bros. Lumber Co., N. Tonawanda, N. Y.: Steamer—C. H. Green, Capt. C. E. Little, Engineer Wm. Ormsby. Schooner—Genoa, Capt. D. C. Ryan.

Squires, J. W., Marine City, Mich. Steamer—Jim Sheriffs, Capt. Samuel Olson, Engineer Wm. P. Eales. Schooner—Jas. Mowatt, Capt. E. P. M. Titus.

Saginaw Bay Transportation Co., Cleveland: Steamer—Rhoda Emily, Capt. L. F. Hunt, Engineer J. D. Budd. Schooner—Hattie, Capt. A. D. Sheldon.

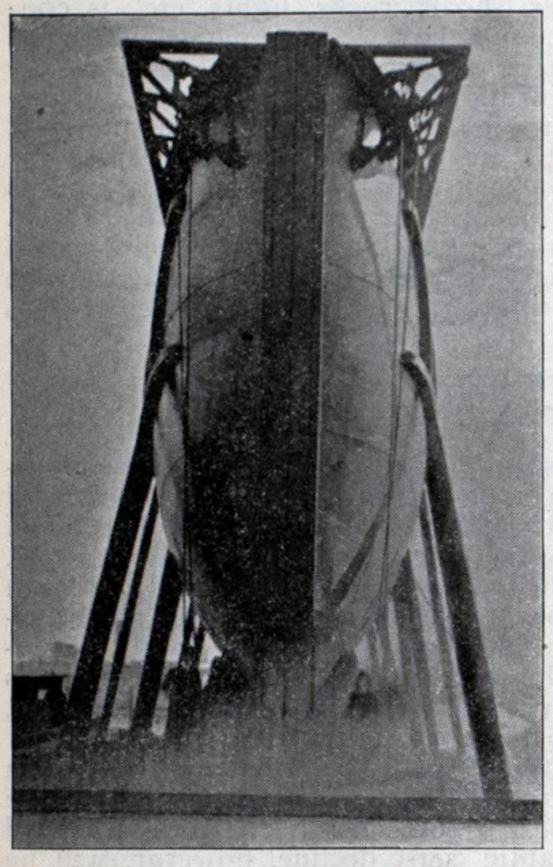
Avery, W. A., Detroit: Steamer—M. T. Greene, Capt. P. F. Powrie, Engineer M. Reck.

CONDITION OF ICE ON THE LAKES.

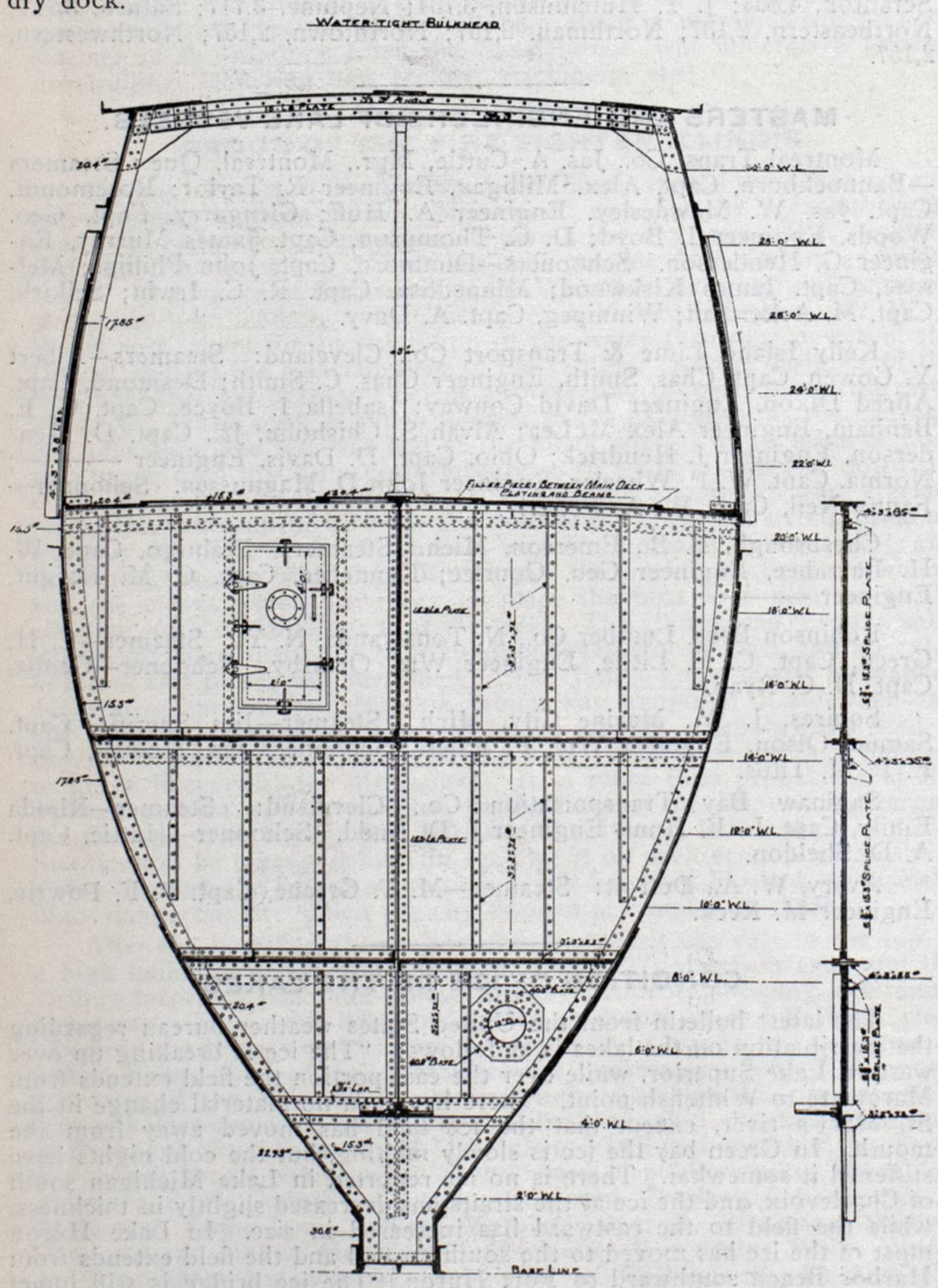
The latest bulletin from the United States weather bureau regarding the ice situation on the lakes is as follows: "The ice is breaking up over western Lake Superior, while over the east portion the field extends from Marquette to Whitefish point. There has been no material change in the St. Mary's river, except that the ice field has moved away from the mouth. In Green bay the ice is slowly melting, but the cold nights have stiffened it somewhat. There is no ice reported in Lake Michigan south of Charlevoix, and the ice at the straits has decreased slightly in thickness, while the field to the eastward has increased in size. In Lake Huron most of the ice has moved to the southern end and the field extends from Harbor Beach southward to Port Huron. The ice bridge is still intact although small pieces are breaking off. The rivers are practically open. Ice was running freely out of Lake St. Clair during the early part of the week. The ice field over western Lake Erie has broken up and the steamer City of Detroit made the first trip to Cleveland April 2, meeting with little resistance from ice. Over the eastern end the ice has increased in quantity, but is breaking up. Conditions are about the same on Lake Ontario. In comparison with the same period last year, the conditions are about the same over eastern Lake Superior and Green bay with considerable less ice in Lake Michigan. In Lake Huron there is about the same amount of ice reported in the same localities. There is less ice in western Lake Erie and about the same in Lake Ontario."

LAUNCHING A CAISSON.

A rather unique yet somewhat hazardous undertaking was successfully accomplished on Saturday morning last, when the caisson for dry dock No. 2 at the New York navy yard was launched from the Pusey & Jones yard at Wilmington, Del. A strong westerly wind through the night foreboded a delay, but about 8 o'clock in the morning active preparations were in progress to put the gate in the water. The accompanying photographs will give some idea as to the magnitude of this task and it will be seen that great care had to be exercised in the removal of the shores and blocks. This was necessary on account of the great height of the caisson and the narrowness of its base. The usual practice of wedging up was omitted, the blocks being split and removed, as there was some fear of loosening the cradle with a great deal of hammering and wedging going on.



Great care had to be given to the depth of water into which the caisson was launched and the length of the ground ways had to be carefully calculated. The former was well taken care of by dredging a great hole at the end of the ways of sufficient depth to prevent striking. The ground ways were carried out for a distance of 65 ft. from the shore line, thus insuring a certain amount of buoyancy before the gate left the ways. With all this precaution the caisson had the appearance of a diving duck when it left the ways, but it came up beautifully and rode on an even keel. Considering the size of this huge gate and the water in which it was launched, it was a decided success and the builders are to be congratulated. The navy is likewise to be congratulated in having such an efficient water stopper to use in its latest dry dock.



SECTIONAL VIEW OF THE CAISSON.

Although the lines of this huge affair can hardly be called graceful, the good plate work, the smooth appearance of the hull and the neatness of the fitting work resulted in very good and substantial lines. That the caisson is a huge affair can be seen by the following figures: Length on deck, 92 ft. 1½ in.; length on sill, 73 ft. 8¼ in.; breadth at deck, 15 ft.; depth, 32 ft. The designed displacement was about 540 tons.

The caisson is provided with a winch at both ends between decks with hawse pipes and bitts and fairleads in the vicinity. Amidships is placed a centrifugal pump of 3,000 gallons capacity per minute for discharging the water from the caisson. Means for filling the caisson tank are provided by three 12-in. openings on both sides. For filling the dry dock ten 20-in. culverts were provided, six on the lower line and four on the upper. The 12-in. and 20-in. openings were controlled by gate valves of corresponding sizes. These valves were operated by means of a wheel and screw between decks and provision is also made for operating all of these valves by hydraulic cylinders. A locomotive boiler below the lower deck will supply power for operating the winches and pump.

An interesting feature of this caisson is the arrangements at the ends of the upper deck, where by means of a sponson deck sufficient width is gained to allow the passage of wagons, carts, etc., across the top of the caisson. The advantage of this feature is obvious when the great length of the dock is taken into consideration and the saving of time and trouble is thought of. The accompanying cut showing a section of the caisson will give some idea regarding the general construction, scantlings, etc. As the caisson is without a name it was also without a sponsor. The launching was witnessed by a great number of interested spectators. Lieut. R. B. Higgins, U. S. N., is the inspector in charge of the construction.

DECISION IN THE ARTHUR ORR SALVAGE CASE.

Copies of the opinion of the United States court of appeals in the Arthur Orr salvage case have just been received. The case involves the amount to which the White Line Towing Co. of Duluth is entitled for service in the rescue of the steamer Arthur Orr and cargo in November, 1898, on the north shore of Lake Superior at Baptism river. The award of the lower court was cut down one-half. It develops that the court of appeals finds that the White Line Towing Co. made a contract to perform services upon a basis of the same compensation as was being paid other wreckers for similar service. The Inman company was the other concern upon the scene at the time. Following is a sypnosis of the opinion:

"There are three methods of compensation for salvage services. They are, first, by a share of the salvage in cases where the services are voluntarily rendered and there is no express contract; second, by the payment of an agreed compensation in case of success only, and third, by payment at all events of an agreed compensation under a contract. The third is the customary method upon the great lakes. There is nothing strange or improbable in the contract which the owners and underwriters of the ship and cargo allege was made with the White Line Towing Co., to the effect that it would render its services for the same reasonable compensation by the day that the agent of the steamship and of its owners agreed to pay other wreckers who furnished like assistance. Such an agreement was the customary and probable contract under which such services were usually rendered at the place where, and under the circumstances in which these parties found themselves. When the White Line Towing Co. first appeared upon the scene the steamship was in no great extremity, in no danger of immediate destruction or loss. She had lain quietly on the shore for thirty-six hours and her master had already engaged Capt. Inman of the Inman Tug Line to go to Duluth for a wrecking outfit to relieve her. On the afternoon of Nov. 24, 1898, Capt. Singer, manager of the White Line Towing Co., arrived at the steamship with a tug, a barge and seven men. Neither he nor his company had been requested to render any assistance. Capt. Singer tendered to the master of the Orr the services of his tug and barge and informed him that he had been directed by the underwriters to come to his aid. The master replied that he had already engaged the manager of the Inman line to go to Duluth and return with a wrecking outfit to save the ship and cargo. The going rates, rates which other wreckers were receiving, were reasonable by the day for the tugs, barges, pumps and other apparatus used, and the testimony is convincing that it was only after Capt. Singer had agreed to accept compensation at these rates that he was permitted to assist the stranded vessel.

"These facts constituted a complete contract on the part of the owners of the vessel and cargo to pay, and the White Line Towing Co. to receive the usual compensation by the day for its services, and its recovery should be reckoned on this basis. The second question presented is, was the White Line Towing Co. guilty of embezzlement of a part of the cargo, or of such negligence in its care that the owners of the ship and cargo may have a deduction made from the amount owing the White Line Towing Co. for its services? The court below answers this question in the negative. It is certain a large portion of the cargo was stolen, but a majority of this court are of the opinion that the evidence that the White Line Towing Co. participated in the larceny is not so clear as to warrant a reversal of the court below on this issue. The conclusion reached is that the decree below must be reversed. That C. W. Elphicke and others recover their costs in this court, and that the district court be directed to enter a decree in favor of the White Line Towing Co. for $5,245, instead of $10,500, and that it recover none of its costs in the court below."

DARIUS COLE CASE DECIDED

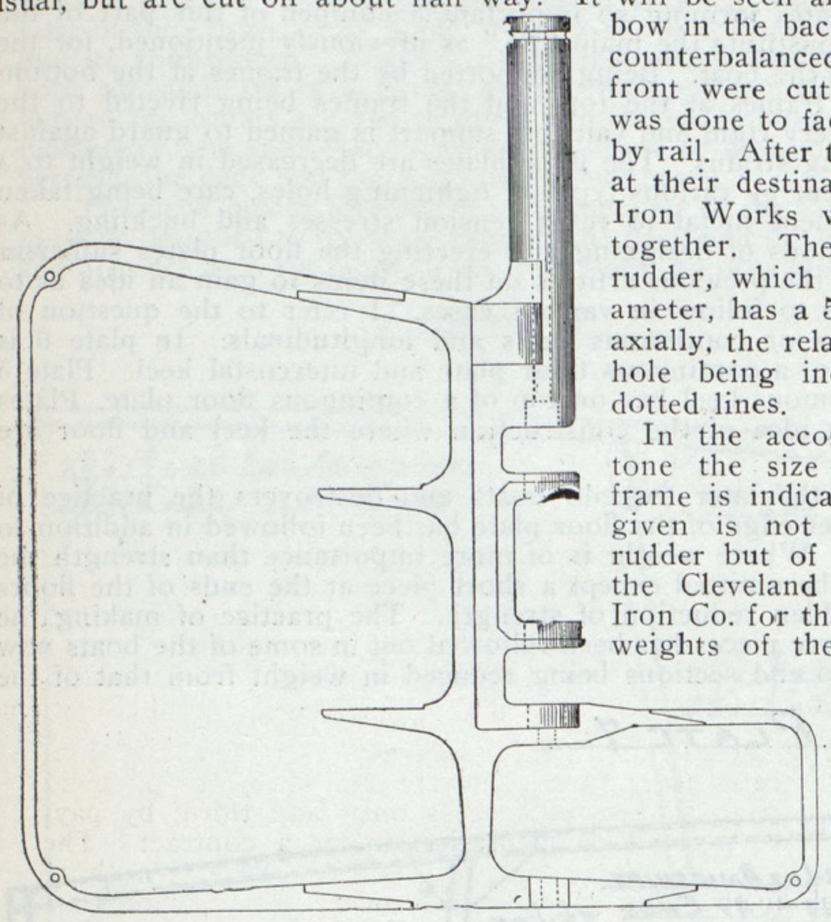
Judge Carr has filed his opinion in the H. W. Williams Transportation Co. suit against the Darius Cole Transportation Co. of Detroit. It will be remembered that the Darius Cole was sold to the H. W. Williams Transportation Co. on the guarantee that the steamer was capable of making 15 miles an hour. The purchase price of the steamer was $125,000 and $75,000 was paid down. The vessel upon test failed to make quite 15 miles an hour. After reciting the facts and commenting upon the positions taken by counsel the judge concluded as follows:

"After listening to the taking of the testimony in open court for five days, and after listening to the able and exhaustive arguments of the eminent counsel in the case, and after fully examining the briefs on both sides, I think the controlling equities are with the complainant and, therefore, upon the whole record I think the complainant has the right to have the contract rescinded. The defendant must take the boat Darius Cole back and take her from the port of South Haven and must refund the $75,000 paid, with interest at 5 per cent. from Sept. 25, 1899. Defendant should also deliver up the notes to be canceled; should discharge the mortgage and should pay to complainant $1,770 insurance, $500 taxes and $423, the cost of laying up the boat for two seasons. I do not think complainant should receive anything further."

The judge decides that complainant shall have costs. The case will be taken to a higher court.

RUDDER FRAME OF BATTLESHIP OHIO.

The Cleveland City Forge & Iron Co. of Cleveland recently shipped to the Union Iron Works, San Francisco, the rudder frame for the battleship Ohio, forged and finished at the company's plant in the past few months. The sketch presented herewith is an outline elevation of the huge forging. This rudder differs from others forged at the same works on government orders. The braces do not extend across the frame, as is usual, but are cut off about half way. It will be seen also that the big bow in the back and the small counterbalanced bow in the front were cut in two. This was done to facilitate shipping by rail. After the pieces arrive at their destination the Union Iron Works will rivet them together. The stock of the rudder, which is 18 in. in diameter, has a 5-in. hole bored axially, the relative size of this hole being indicated by the dotted lines.



Rudder frame of battleship Ohio.

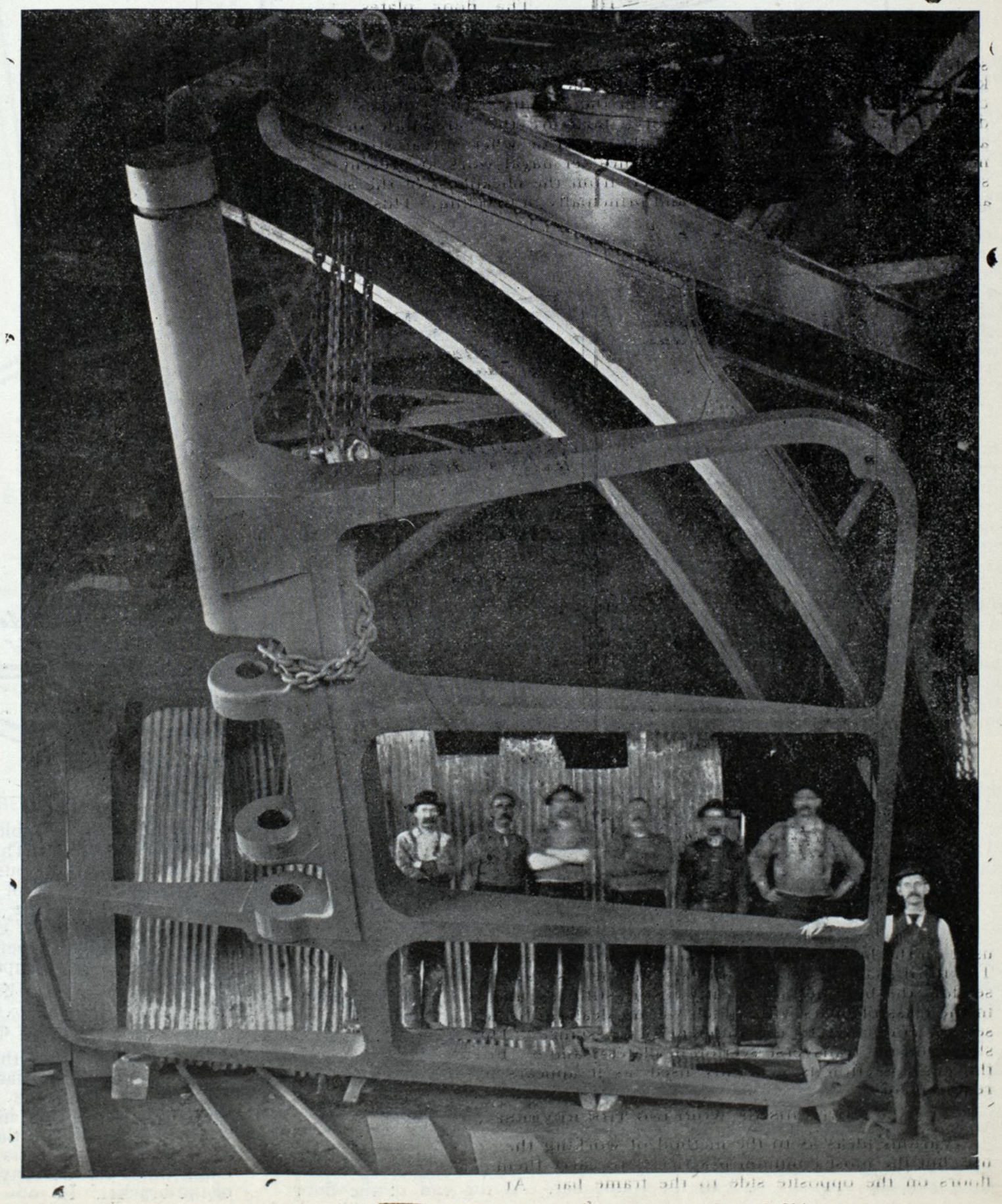
In the accompanying halftone the size of the rudder frame is indicated. The view given is not of the Ohio's rudder but of that forged by the Cleveland City Forge & Iron Co. for the Alabama. The weights of the two are substantially the same—about 16 tons. The extreme height of both is 20 ft. 6¾ in., and the extreme width 19 ft. 4 in. The extreme thickness of the frame is 38 in.; diameter of rudder stock in both cases, 18 in.

OILING THE SEAS.

From Syren & Shipping, London.

The United States hydrographic office is again interesting itself, for the benefit of mariners, in the important question of oiling the sea so as to prevent the angry moving mountains of water from breaking on board and causing dire destruction. There is nothing new under the sun! Consequently, no one need be surprised to learn that the ancients were most explicit in their highly-colored word-pictures with respect to the most miraculous result attending the pouring of oil upon troubled waters. Aristotle pointed out that the thinnest of oily films serves to shelter the sea surface beneath from the grip of a howling hurricane or the caress of a gentle zephyr. It is a far cry from the plodding philosopher of the classics to the more pushful people now dominating the United States of North America. Yet, the middle of the eighteenth century had arrived on our planet before the attention of navigators was distinctly drawn to the advisability of oiling the sea when it commenced to threaten the safety of a devoted barque and her crew. In 1757, the illustrious American, Benjamin Franklin, while at sea in company with several owners of merchant ships and water-bruisers of the good old sort, was quick to observe that two of the fleet made much better weather and enjoyed far smoother water than their consorts. Apparently, in those days, the ships' cooks were less regardful of slush-cask perquisites than are their twentieth century successors. Franklin, always anxious to find out the causes of natural phenomena, at once commenced to question and cross-examine the old skipper of the craft which then had the honor of carrying the American philosopher, and was informed that the exceptionally smooth water around the two ships was due to the greasy matter thrown overboard by their cooks. After return to dry land he experimented on the stilling of waves by oil, and published his results. The hardy fishermen who wooed fickle fortune on the inhospitable coasts of Greenland many years ago, were well aware of the utility of oil as a sea smoother. Curiously enough, they preferred to keep this knowledge to themselves, under the erroneous idea that this oiling process somehow made the seas more dangerous outside the protected area, and might be objected to by mariners without oil. At some places oil has been led along the bottom of the harbor by means of pipes, through which the oil was forced so as to find an upward path into the boiling waters at the harbor mouth; and a somewhat similar effect has been produced by firing shells, filled with oil, from a rocket, which scattered the oil over the sea surface. At sea, however, the use of oil fell into desuetude about 1840; and it remained for the United States hydrographic office to bring the matter before the nautical public quite recently. This fact was pointed out some time ago by Admiral Wharton, the British hydrographer, in a brief review of a pamphlet written on the oil-smoothing system by Admiral Cloué, of the French navy. Concise rules for the use of oils to protect vessels in stormy waters were given in a prize essay submitted to the Hamburg Nautical School by Capt. R. Karlowa of the Hamburg-American Steam Packet Co. That officer's practical suggestions have been adopted by the highest authority, not only in his own country but also in the United States and elsewhere. That time-tried nautical adage—different ships, different fashions—undoubtedly holds true with respect to the oiling of the waves. In order to obtain the greatest immunity from sea damage by the least expenditure of oil requires much careful consideration. A seaman named Wilson of the United States navy invented an oil distributor which received commendation from the hydrographic office at Washington. The kind of oil is also a consideration not to be ignored. Cocoanut oil might serve in the tropics, for example, but be utterly useless at a low temperature. During the gale of December, 1896, while crossing the North Pacific, the favorite liner Empress of India, Capt. Archibald, used oil from both bows with excellent effect. A mixture consisting of 70 per cent. of fish oil, and 15 per cent. each of colza and kerosene, was found most useful; and the amount expended was about one gallon an hour through oakum placed in the drains of the forward water-closets. Bags filled with oakum, previously saturated with oil, are pricked with a roping-needle in several places and towed overboard; thus insuring a smooth sea astern while running. On one occasion, four bags employed thus for sixteen hours, required five gallons of seal oil. For the benefit of our many nautical readers, we may mention that the United States hydrographic office at Washington will supply, without charge, a copy of Capt. Karlowa's prize essay to any shipmaster or officer applying for it.

A dispatch to the North German Lloyd officials, New York, from Bremen announces the launching of the twin screw steamship Kronprinz Wilhelm at the yards of the Vulcan Ship Building Co., Stettin. The ship is designed to be just a shade of a knot faster than the Hamburg-American liner Deutschland, which holds the record across seas. She will have engines of 33,000 H.P. or 3,000 less than the Deutschland. She is 662 ft. long, 66 ft. beam and of 19,500 tons displacement.



Rudder frame of battleship Alabama—Same dimensions as that of Ohio.

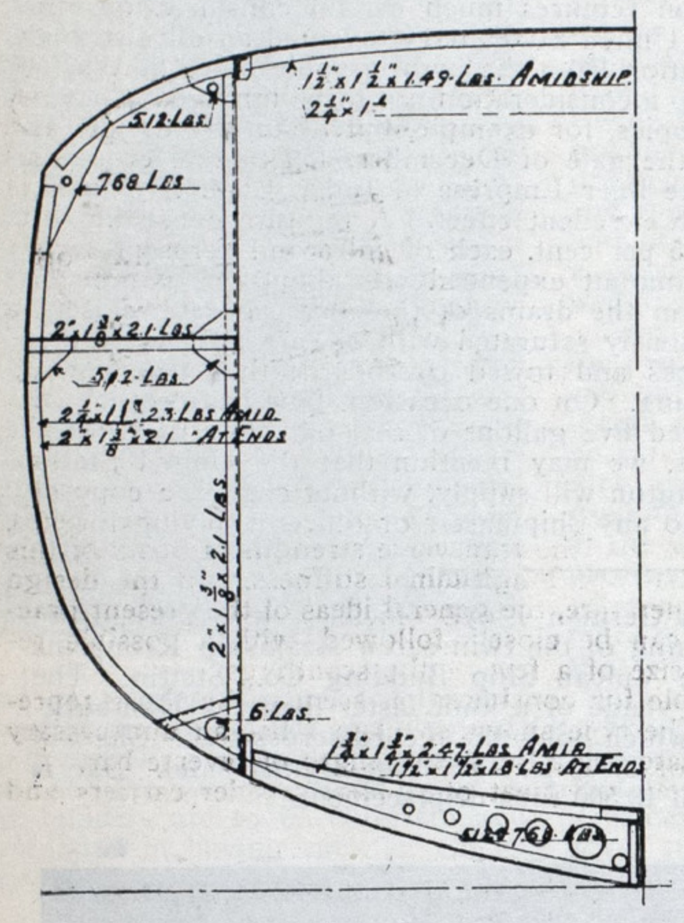
CONSTRUCTION OF TORPEDO BOATS AND DESTROYERS.

BY GEORGE HERBERT WILSON.

TRANSVERSE FRAMES AND SCANTLINGS.

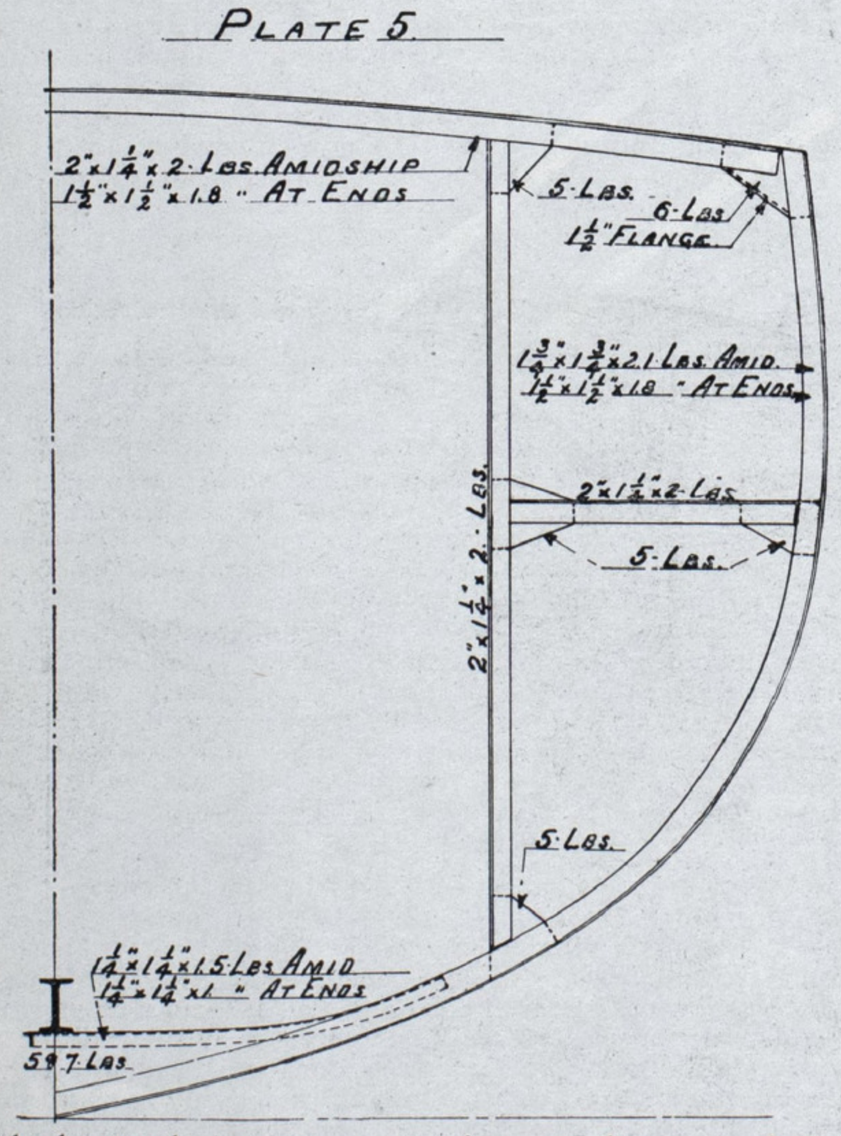
Departing from the consideration of longitudinal strength, the matter of transverse stiffness must require considerable attention, although not calling for as much as the former, and the weight and size of scantlings should be designed in proportion. The importance of the transverse framing of a boat cannot be gainsaid, nor can too much thought and care be used in the design thereof, the correct proportion of the weights to the strength depending upon the scantlings. As in all portions of the hull structure, a correct idea of the principal functions must be known to provide adequate means for their performance. The main work devolving upon the transverse framing is that of maintaining the shape of the boat as constructed, providing sufficient stiffness to prevent any tendency to crushing or change of form in the transverse direction. In addition to this important duty the transverse frame must be regarded as a "tie member" connecting the various portions of the boat in its vicinity. The frames themselves are tied together by the floor plate. The deck is secured to the frames by means of beam knees or brackets. The longitudinal bulkheads receive additional support in the brackets connecting them to the frame at the bottom and to the deck beam at the top.

PLATE 6.



The floor plates, however, form the main connection and are relied upon for stiffening the lower portion of the hull structure in conjunction with the keel and longitudinals, and their depth is decided by the amount of machinery, boilers, cargo. etc., carried in the vicinity. The "shapes" most desirable for a transverse frame of a boat are the bar, angle or bulb angle. The first of these is, no doubt, superior where great strength is necessary, and it is used on some of heavier naval work at present. The second finds universal favor, however, from the cheapness of the section and the greater ease in bending, and principally in beveling. This shape is

PLATE 5.



used on the boats whose transverse sections are shown on plates 5 and 6. The third shape is very desirable from the disposition of the metal in the section, the bulb adding greatly to the stiffness, and is used a great deal in the class of boats with which we are dealing, from the lightness of the section compared to the moment of resistance. This style of frame is shown on the transverse section in plates 7 and 8. For the reverse frames the angle section is generally used, as it appears to answer to all the requirements.

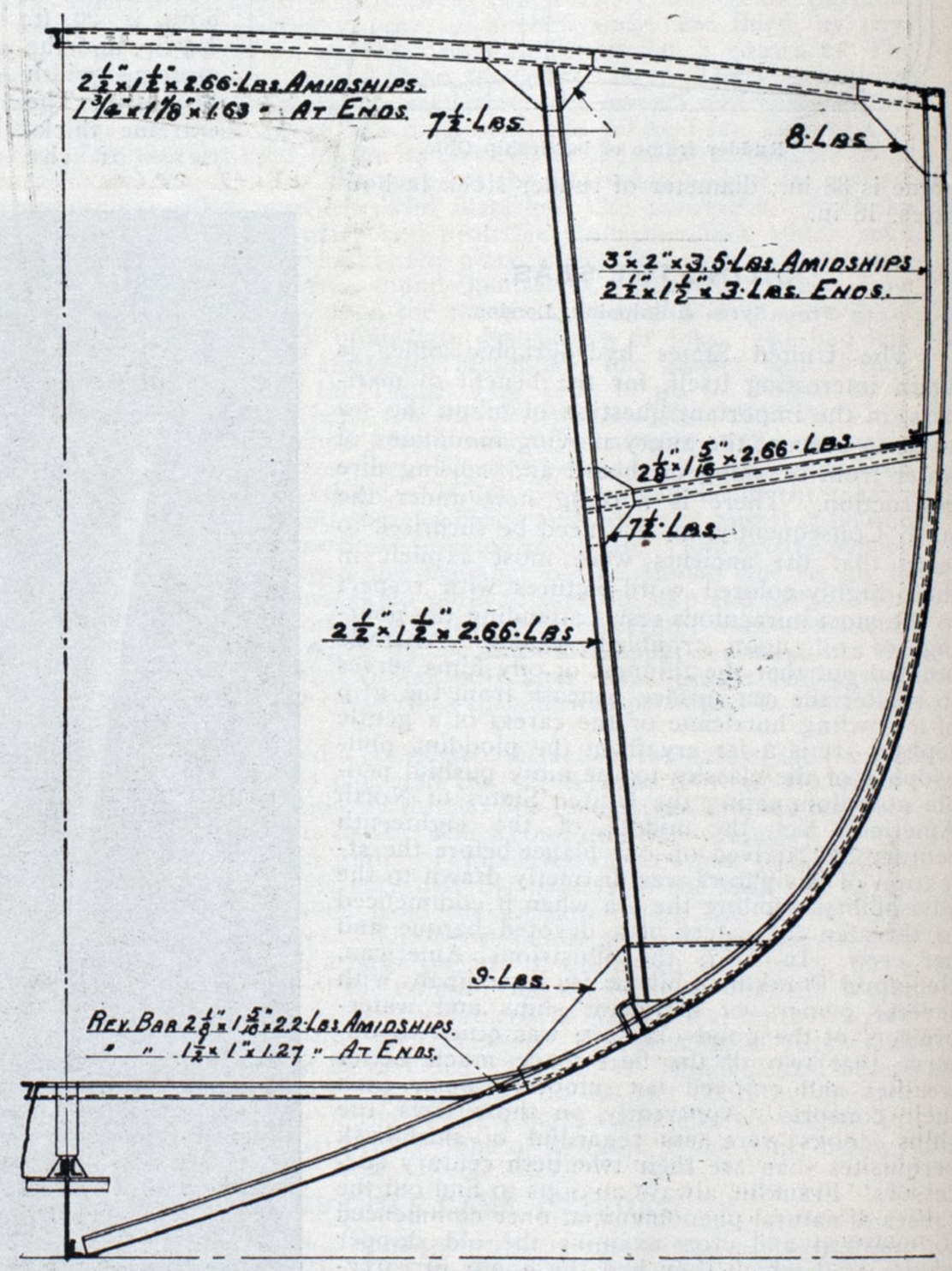
METHODS OF WORKING THE REVERSE FRAMES.

Various ideas as to the method of working the reverse frames are in use, but the most common practice is to carry them along the top of the floors on the opposite side to the frame bar. At the end of the floor plate the bar is bent and carried up along the frame for some distance, the distance varying on alternate frames. In some cases the bulb angle section is used as a reverse bar, as shown on plate 7. In the transverse section shown on plate 5 the angle shape is used.

The floor plates forming so important a number of this part of the hull structure, constitute the main "tie," as previously mentioned, for the lower portion of the boat. Being supported by the frames at the bottom and the reverse frames at the top, and the frames being riveted to the shell plating, a very rigid and valuable support is gained to guard against transverse racking strains. The floor plates are decreased in weight to a considerable extent by various types of lightening holes, care being taken to provide sufficient metal to resist tension stresses and buckling. As regards the methods of designing and erecting the floor plates sufficient has been said in the previous articles on these items to gain an idea as to the best practice to follow in various cases. I refer to the question of continuous floors or continuous keels and longitudinals. In plate 6 is shown the type of a continuous floor plate and intercostal keel. Plate 5 shows the continuous keel bar on top of a continuous floor plate. Plates 7 and 8 give an idea of the construction where the keel and floor are semi-continuous.

In some of the later torpedo boats and destroyers the practice of flanging the upper edge of the floor plate has been followed in addition to the reverse bar. Where weight is of more importance than strength the reverse bar can be omitted except a short piece at the ends of the floors to prevent a sudden reduction of strength. The practice of making the floor plates in three pieces has been followed out in some of the boats now building, the two end sections being reduced in weight from that of the

PLATE 7.



middle portion. Double riveted lap butts form sufficient connection between these plates. This method has two very important features, the first of which is obviously the great saving in weight, and the second is the decrease in cost of material and ease in handling and erecting the smaller plates. In the lightening of floor plates considerable attention has been given to the cheapest and most effective method of doing the work. This must depend largely upon the types and sizes of the holes designed. I will attempt to cover a part of this ground in a later article, touching upon the various machines, dies, etc., likely to enter into such work.

BRACKET CONNECTIONS TO THE DECK BEAMS.

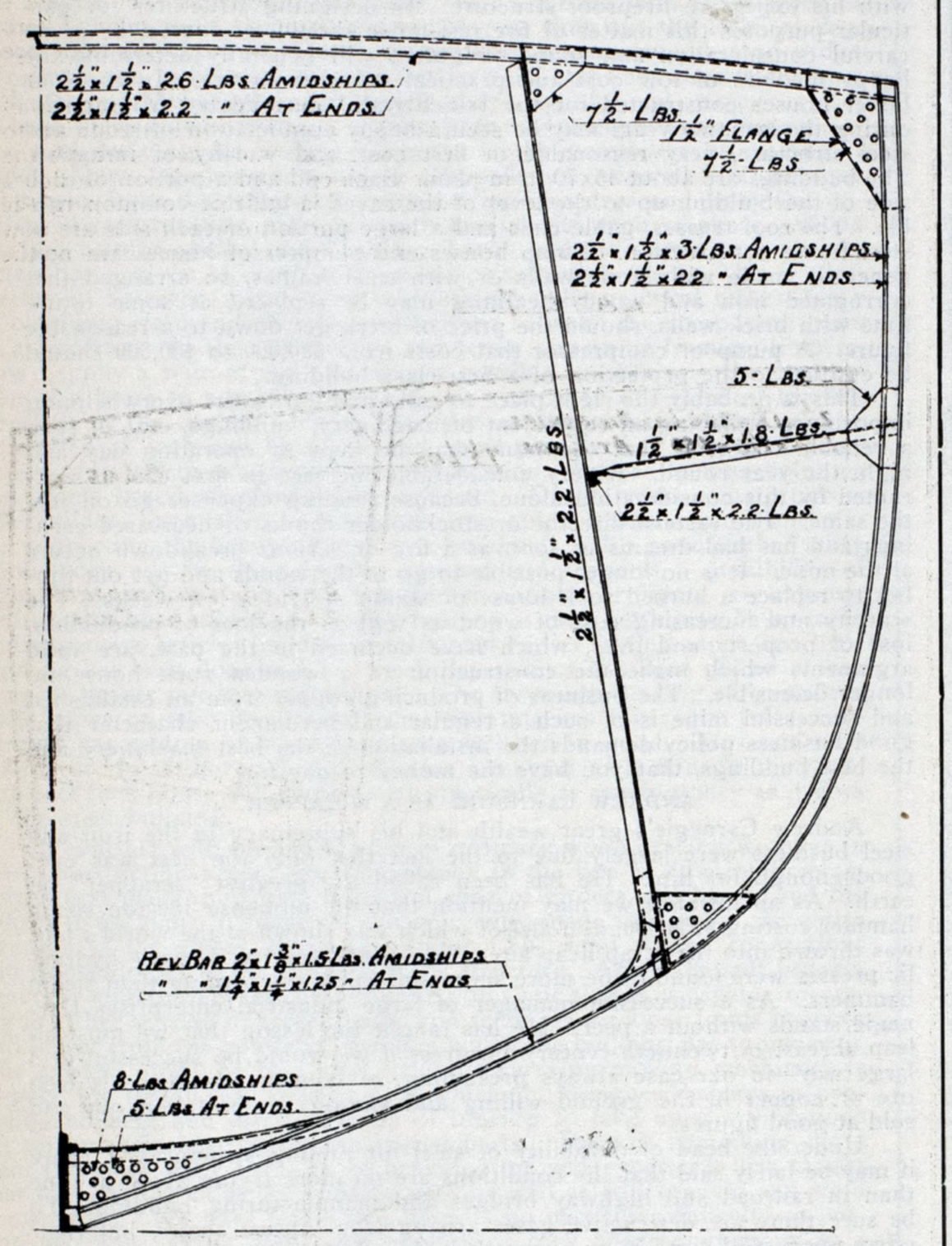
Continuing along the line of the transverse scantlings, we will ignore the bottom and side plating, which will appear in a later article, and give some attention to the bracket connections to the deck beams. These must necessarily vary in shape and size to conform to the shape of the deck. The depth of these brackets on frame and beam is determined by the number of rivets necessary to gain the required strength. Lightening holes can be conveniently allowed without impairing the efficiency of the bracket. In some boats the practice of flanging the bracket on the

unsupported side is followed. The thickness of these "beam knees" is dependent upon the work required. The work referred to must compare somewhat to the duties of the transverse frame, in that the deck beam acts as a "tie" between the opposite sides of the boat and also supports the weight of the deck and its proportion of the adjacent load. It is necessary therefore that the "beam knee" should form a rigid connection between the parts and properly support and resist all the strains thrust upon it.

Various types of "knees" are shown in the accompanying plates. Plate 6 gives an idea of the connection between beam and frame on a boat of the "turtle deck" type. Plate 7 shows an ordinary "spring" deck and its connections. Plates 5 and 8 also outline this type of connection with the addition of a flange on the unsupported side of the bracket. Where the beams are cut to allow for the easy shipping of boilers and machinery, the same care must be displayed in designing the connection between the deck and the longitudinal bulkheads.

The deck beams forming the top member of the "transverse section" must be designed to properly support the deck and the load in the vicinity and also act as a tie between the two sides, as previously stated. In the

PLATE 8.



class of boats with which these articles are dealing the angle and bulb angle shapes are generally used for the above purpose, the weight and size depending upon the requirements.

In the case of excessive local strains, the size of the beams is increased and in some boats every third beam was of the larger dimensions. In some cases the continuous beams were of the larger size. Relying upon the transverse framing and its connections to resist the tendency to "change of form" all of the component parts must be regarded and an idea of the separate function of each outlined. Following out this idea the various smaller members must be taken up as well as the main items mentioned.

We have such parts as, first, the longitudinal stiffener in the middle of the coal bunker, connecting the frame to the stiffener on the longitudinal bulkhead and the brackets forming these connections; second, the brackets connecting the longitudinal bulkhead with the floor plate or reverse frame; and third, the bracket supporting the coal bunker floor plates, which form a rigid connection. The first of these, the "longitudinal stiffener," is generally placed at about the middle of the coal bunker space and is carried on every alternate frame. An angle or an angle bulb with a double bracket at the shell and another at the longitudinal bulkhead usually completes this construction. In some boats where a longitudinal is carried through the coal bunkers, a horizontal plate bracket is used to make the outboard connection. The second of these smaller items, the longitudinal bulkhead "heel bracket," lends material aid in transmitting certain strains form the floors to this bulkhead and makes a firm connection between the parts. The connection to the bulkhead is usually made by flanging the plate or securing it to a stiffener when they are worked on the inboard side. The connection to the floor is made by letting it down between the reverse bar and the floor plate or by flanging the bracket and riveting the flange to the reverse bar. This stiffener forms an excellent tie between the shell and the bulkhead and increases the resistance in its locality. The third item the coal bunker floor bracket, forms an additional tie between the frame and the bulkhead stiffener. This bracket is riveted to the frame and stiffener with a flange on the upper edge to take the coal bunker floor plates.

OTHER PARTS ENTERING INTO TRANSVERSE STRENGTH.

Other portions of the hull structure which enter prominently into the transverse strength are the lower deck beams, platform beams and special bracing or supports, such as blower supports, steam pipe supports, etc., all of which tend to increase the stiffness in and about their locality. In some of the boats built the practice of constructing a belt frame about every fourth frame was followed. This no doubt adds to the transverse strength, but it has been found of unnecessary importance, considering the weight involved.

It will be noticed in all "midship sections" that a reduction is made in nearly all of the members entering into the transverse or longitudinal strength for that portion of the boat forward and abaft of the main body. The main body generally occupies about two-thirds of the length, the ends about one-sixth each. This is done, as is well known, from a decrease in the strains to be resisted and also from the fact of the end sections of a boat being stronger by reason of their shape and size. This reduction, however, is gradually being limited to the forward portion of the boat, as it has been found that owing to the strains resulting from supporting the propelling gear, the stern sections must not differ radically from those amidships. Extra size and weight for the after scantlings is also necessary to reduce the vibrations, and practice has shown that a very stiff hull is an absolute necessity in this vicinity.

In addition to the ordinary transverse frames the athwartship bulkheads must enter into the transverse strength of a boat, forming as they do rigid supports to the structure in their respective localities. In the general outline of a boat, the increase in the number of water tight subdivisions guarantees a more rigid hull structure, besides the all-important fact of safety when in an accident affecting flotability. All things being considered, it has been found that the transverse strength of boats of this class is relatively greater than the longitudinal stiffness. In the design and construction of a boat, therefore, the general ideas of the present practice of transverse framing can be closely followed, with a possible reduction in the weight and size of a few of the scantlings.

The types most favorable for consideration seem to be those represented in plates 5 and 6. The type shown in plate 7 has an unnecessary depth and weight of floor plate and a too great length of reverse bar.

The next of these articles will treat of rudders, rudder carriers and bearers, and the fittings thereof.

VICKERS CO. BUILDING HOLLAND SUBMARINES.

The item of interest to American readers in the annual report of Vickers Sons & Maxim, Ltd., aside from the fact that the firm declared a dividend of 20 per cent. last year, is the following:

"Referring to the statements that have recently appeared in the papers as to a supposed amalgamation with certain American firms your directors have never had any intention of proposing any amalgamation whatever. They have, however, been in negotiation with some American firms with a view to getting the company's system of ordnance manufactured there on a scale commensurate with its importance. So far the terms offered have not been such as your directors could accept, but they have not abandoned their intentions. Your directors have acquired on favorable terms the sole rights for Europe for the carriage lighting system of the Consolidated Railway Electric Lighting & Equipment Co. and for the well known Holland submarine boat, and they are pleased to be able to report that his majesty's government placed an order with them at the end of last year for five of these boats, the construction of which is already far advanced at your Barrow yards."

NAVAL STRENGTH OF THE NATIONS.

The naval intelligence office, after careful investigation, has just completed a statement of the comparative naval strength of the leading maritime nations. The naval tonnage is found to be in excess of the commercial tonnage of some and with two powers the number of warships now building exceeds the total strength of those navies ten years ago. Great Britain exceeds France, Germany and Russia combined in the built and building naval tonnage. France follows England, Russia comes third and the United States fourth, Germany having been displaced by this country, which now has a lead of about 3,000 tons. Japan is sixth, Italy seventh. The United States has ninety-eight vessels, with a tonnage of 302,650, and fifty-five building with a tonnage of 247,420. England has 646 warships with a tonnage of 1,795,410 and a large number building. France has a total tonnage of 714,190, representing 428 vessels built and building; Germany, 447,840 tons in 253 ships built and building; Russia, 569,580 tons in 332 ships, 420,440 tons being built and 149,140 building, and Japan has 250,870 tons, representedo by 138 warships.

With its two very large dry docks the Newport News Ship Building & Dry Dock Co. of Newport News, Va., will certainly be equipped for repair work on a very large scale in the future. Dimensions of the larger dock at this yard, to be known as No. 2, are: Extreme length, 860 ft. 6 in.; length on bottom, 804 ft.; width on top, 162 ft.; width on bottom, 80 ft.; width of entrance at top, 114 ft.; width of entrance at bottom, 84 ft.; depth of water over sill at mean high water, 30 ft.; height of sill above bottom of dock, 4 ft. 6 in. Dimensions of dock No. 1 are: Extreme length, 638 ft. 7 in.; length on bottom, 573 ft.; width on top, 130 ft.; width on bottom, 49 ft. 4 in.; width of entrance on top, 96 ft. 3 in.; width of entrance on bottom, 50 ft.; draught of water over sill at mean high water, 24 ft. 6 in.; height of sill above bottom of dock, 1 ft. 8½ in.

STEEL CONSTRUCTION FOR MINES.

IN MORE SUBSTANTIAL BUILDINGS, SHAFTS, ETC., THE LEADING COMPANIES OF THE LAKE SUPERIOR REGION ARE TO KEEP PACE WITH THE MANUFACTURING CONCERNS—STEEL TO BE LARGELY USED INSTEAD OF WOOD.

The first mining in the Lake Superior region was surface mining. The first blow of the pick ripped the sod and revealed the ore. For many years this method of mining continued and it was thought that it would continue indefinitely. No other method was even dreamed of. Gradually, however, it was discovered that the ore could be won more readily by underground mining by means of shafts and drifts. Sometimes jack pine was used as means of support, but more frequently pillars of ore were left to support the overhang. Then the problem was to gradually bring down the pillars which contained as much ore as the rooms themselves. Originally blasting was all by black powder and all drilling was done by hand. Now it is dynamite and compressed air. Originally the men were lowered into the mines in the very buckets by which the ore was hoisted. Now there are skips with safety clutches. The evolution has been gradual until today the system of mining has been reduced to a science. The latest innovation is the use of steel, even for shafting in the mines. Ore, having gone through the furnace and mill, may be said to have received its collegiate education; and thus we see the child of iron, returning to the mine, to assist in the deliverance of its parent. An address, recently delivered by Mr. Jackson at a meeting of mine managers in Ishpeming, Mich., relates quite interestingly the advantages of steel in mining construction. In part he says:

It is quite in line with the doctrine of contraries that a resident of a section of the upper Michigan peninsula, where copper is the chief product, should be called upon to talk to an audience composed largely of iron country people on the general subject of steel construction for mines. It is a fact that the copper mines of this district and of the west have gone into steel construction more extensively than have the mines whose product is the ore from which steel is manufactured. There are, of course, many reasons why this should be so, chief among which is the fact that the shafts, machinery and equipment about the iron mines are not generally of such an extensive or permanent character, nor do they have to meet such exacting requirements as the various mining plants in copper production. Our iron country friends are, however, gradually beginning to appreciate the usefulness of their own product. On the other hand, the iron counties have been much in advance of ourselves in the matter of electric street railways, electric mine hoists and pumps, and underground tramming, in which construction copper enters so largely.

SHOULD BE CALLED THE STEEL AGE.

These examples are only new illustrations of the old saying about the shoemaker's wife having no shoes. The nineteenth century has been called the iron age. It should be called the age of steel, and Sir Henry Bessemer's epoch-making invention has been ranked next in importance to that of the steam engine itself. These two great inventions have been the foundation of the iron mining industry. Whether the new century, whose coming greatness defies the imagination, shall be distinctively the age of electricity, greatly increasing the use of copper, remains to be seen. Possibly there may be developed in the near future some 16 to 1 ratio between the black and red metals, which shall form a sound basis for continued prosperity in the upper peninsula, because we have both precious metals, and in great abundance.

There being but two practical forms of building for most mining purposes, the present paper will be largely devoted to comparing the merits and advantages of wood and steel. This task is undertaken with the idea of making comparisons as fair as may possibly be made by a man in my particular business. As the representative of a prominent manufacturing company it has been my function to assist somewhat in adapting steel construction to the various classes of buildings and other structures erected for iron and copper mining, and auxiliary uses. It is the purpose of this paper to point out some of the advantages and disadvantages of so-called steel buildings. In large cities and manufacturing districts, experience has developed for shops a type of construction in almost universal use, namely, a frame structure to carry all roofs, machinery and loads from traveling cranes; which frame work is encased in by light brick or terra cotta walls, or occasionally a covering of corrugated iron. The steel skeleton sky scrapers of the great cities are generally aralagous construction; that is, all interior and exterior walls, floors, etc., are carried on the steel frame work. Such buildings, although with wooden floors, doors and window frames, and containing furniture and combustible merchandise, are generally called fireproof buildings—at any rate the fire risk is reduced as far as is commercially practicable.

EXAMPLES OF STEEL CONSTRUCTION AT SOME MINING PROPERTIES.

In the Quincy machine shop and Quincy pump house at the stamp mills we have two fine examples of steel frame and brick construction. This type of construction is, however, obviously not well adapted to shaft and rock houses and stamp mills where there is a great deal of straining and jarring. In this region of severe winter weather we must necessarily make some extra provision to keep out the cold. To accomplish that purpose we have sometimes used considerable wood sheathing in addition to the corrugated iron covering. This is a great disadvantage and you have made a valid criticism when you state that many steel buildings contain entirely too much wood. I am, however, prepared to show that in most steel frame buildings where wood is used for sheathing of sides and roof, it is used in such a way that there can be but little chance for fire to spread. There is, however, one disadvantage in steel structures, which has been dwelt upon by some theoretical and so-called practical people, and that is the fact that they are not so readily overhauled, patched up or strengthened as are wooden buildings when they prove to be poorly designed or too weak for the purpose for which they were built. It is argued very gravely that buildings of timber can much more easily be repaired, columns and beams strengthened and bracing put in when found necessary. My reply to this is that this may be a strong point against the steel building if designed entirely by guess, but it is well to bear in mind that the days when bridges of wood or steel were built by guess have long gone by. Guess work has been superseded by mathematical analysis, and the days of the man who designs large structures of any sort by guess with the comforting thought that he can find the weak places and strengthen them afterwards, when necessary, are also numbered, and he must give way to the man who can design a machine, a tool or a building to meet certain specific requirements in a practical and economical way with reasonable assurance that the thing will work successfully when completed. Coming now to the advantages of the steel bridge, gallows frame, stamp mill, shaft house, etc., we believe that there has been developed a style of construction which contains a minimum amount of wood; is practically safe against ordinary fire risks and meets all climate requirements. I do not call this type of structure a fireproof building, because such a thing has literally never been built. Even steel and brick are not strictly fireproof. The advantages of this practical building may be classified as follows: Decreased fire risk; durability; rigidity; decreased cost of maintenance; adaptability; better light and moderate cost.

On the subject of decreased fire risk in the type now in use for stamp mills, I think an unprejudiced and capable observer would agree that, taking into account the character of the contents in both cases, we have practically as little danger from fire as the merchant or warehouse man with his expensive fireproof structure. In designing structures for particular purposes this matter of fire resistance should, of course, be given careful consideration and sound judgment will generally determine the happy medium of low cost and practical safety from fire. In the four boiler houses constructed for the Isle Royale Consolidated Mining Co. during the last two years may be seen a happy combination of stone and steel structure, very reasonable in first cost, and worthy of imitation. The buildings are about 45x70 ft. in plan. Each end and a portion of each side of the building up to the level of the eaves is built of common rubble. The roof trusses, gable ends and a large portion of each side are of steel frame construction. Pump houses and compressor houses are now generally made with stone walls or with steel frames, so arranged that corrugated iron and wood sheathing may be replaced at some future time with brick walls, should the price of brick get down to a reasonable figure. A pump or compressor that costs from $20,000 to $30,000 should be entitled to the protection of a first-class building.

This is probably the right place to call attention to the overwhelming importance of having an equipment of machinery, buildings, etc., of such a reliable character that the mine may be kept in operation day and night the year round. A very considerable increase in first cost is warranted by this consideration alone, because running expenses go on just the same. The eastern director or stockholder thinks of decreased earnings and has bad dreams as soon as a fire or serious breakdown occurs at the mine. It is no longer possible to go to the woods and get out timber to replace a burned rock house or stamp mill in a few weeks. The scarcity and increasing cost of wood as well as the loss of production. loss of property and lives, which have occurred in the past, are valid arguments which make the construction of a wooden rock house no longer defensible. The business of producing copper from an established and successful mine is of such a regular and permanent character that good business policy demands the installation of the best machinery and the best buildings, that you have the money to pay for.

ANDREW CARNEGIE AS A SCRAPPER.

Andrew Carnegie's great wealth and his supremacy in the iron and steel business were largely due to the fact that only the best was ever good enough for him. He has been called the greatest "scrapper" on earth. As an instance we may mention that the immense 150-ton steam hammer costing $250,000, a model of which was shown at the world's fair, was thrown into the scrap heap after three years' service, because hydraulic presses were found to be more successful for heavy forging than steam hammers. As a successful manager of large industrial enterprises Carnegie stands without a peer. He has taught the lesson that we must all leap abreast of twentieth-century progress if we would be successful in a large way—in our case always presuming, of course, that there is iron ore or copper in the ground willing and anxious to be taken out and sold at good figures.

Under the head of durability of steel for mining structures, I think it may be fairly said that the conditions are no more trying about a mine than in railroad and highway bridges and manufacturing buildings. To be sure there are destructive gases arising from upcast shafts, but their effect upon steel work is no worse than the effect of locomotive gases on trusses of train sheds and overhead crossings. Their corroding effect may be provided against by covering, painting or by protective sheathing of asbestos papers or other effective means. Many of the earliest metal bridges are still in use after a half century of wear and no particular care. Where they have had to be replaced it has been more often on account of the necessity of providing for heavier loads than for any other reason. I think it is without doubt a fair contention that a well-designed steel building will outlast and require much less annual expenditure for maintenance than a building of wood. And unprejudiced observer can hardly fail to be convinced on investigation that the high grade and permanent character of the equipment of the Isle Royale mine, lying just south of Houghton, will mean a greater economy in the operation and maintenance of its plant than has elsewhere been affected in the copper country. The usually very large item of surface work should in this case be reduced to a minimum.

IMPORTANCE OF LABOR-SAVING APPLIANCES.

Right in line with this statement comes the observation that with the introduction of steel buildings and high-grade machinery has come a larger appreciation of the value and importance of labor-saving appliances, in which matter we must confess that mining people are generally much behind their brethren in the manufacturing field. In this matter Carnegie has also been foremost. The development of labor-saving machinery in the manufacture of steel and, indeed, in all American manufacturing enterprises, is the wonder of the world, and has enabled the United States to compete successfully in every manufacturing center of Europe, while paying larger wages to workingmen than are paid by their foreign competitors. With the introduction of the steel buildings has come the possibility of overhead traveling cranes, trolleys, air hoists and various other contrivances. A larger appreciation of the possibilities in the way of labor-saving and fuel-saving machinery and devices is a hopeful sign of the times. It used to cost 20 to 30 cents per pound to make copper. By the introduction of power drills, high explosives, Ball stamps, first

motion hoists, etc., and the carrying on of operations on a large scale the cost price has been brought down to from 7 to 10 cents per pound. Does any one deny that there are still greater economies to be obtained?

It will continue to be my purpose to advocate in season and out of season more careful consideration of problems in labor saving, especially. A natural personal aversion to muscular labor may be at the bottom of this contention. My English father used to intimate as much when I was a boy on the farm. True, it always makes me feel sad to see good human muscle in the shape of main strength and awkwardness doing work which could be done much more economically by steam or by electricity. There are more lazy boys now than formerly. Let us no longer emulate the hard working mule. When I proposed an easier way of accomplishing a piece of work I was called lazy and was comforted by the reflection that a lazy boy in Stephenson's time made the steam engine work automatically, because he was too lazy to turn the valves. He was an early apostle of the new industrial gospel of labor saving.

Another advantage of the steel building, especially for stamp mill work, is the possibility of obtaining a much better lighted structure than with the old style building. Columns may be placed at any convenient point, roofs may be made high with beams or truss spans of any convenient length. It is no longer necessary to fill the air with a net work of heavy wooden posts, beams, girders, etc., to shut out the light of day. Good light and good paint are conducive to cleanliness and good order. Workmen are in better spirits, do better work and keep their machinery in better order where their surroundings are cheerful and attractive. Let us have well lighted buildings. Probably the most important advantage of the steel building for mining purposes is the possibility of making it rigid. Many wooden rock houses especially are afflicted with nervous vibrations from the jerking of ropes on head sheaves and from the unbalanced reciprocating parts of steam engine and rock crushers. Wood has the natural quality of absorbing shocks and vibrations to a greater extent for a given strength of beam or column than steel. This natural quality is, however, much more than offset by the practical impossibility of obtaining rigid and effective connections between the component parts of a building. In the old mortise and tenon system of framing timbers, now happily a relic of the past, it was possible to obtain in the connection of a beam to a column perhaps one-quarter to one-third of the full strength of the timber. Under that system knee braces could only be connected at each end by tenon and small pin, so that they were practically of no effect except to take compression. Splices in long columns and beams were both clumsy and inefficient. Of late years some progressive builders have taken to using cast iron angle brackets and iron bolts for connecting the heavy timbers in a building. With good timber fairly good work can be done in this manner and there is a possibility of tightening up loose joints as the timber shrinks or joints work loose. But good timber suitable for heavy framing is now getting to be a scarce and expensive article; besides, as intimated earlier in this paper, too little figuring has been done and too much dependence has been placed on the mass of timber put into a structure. The thorough bracing of a modern rock house to take up strains from vibrating machinery or from head sheaves has seldom or never been accomplished in wood. To brace such a structure in as thorough and effective a manner as is done in the modern steel rock house will usually cost practically as much money as it does in the steel building.

In contrast with the inefficiency of ordinary wood bracing we have in steel construction a very great advantage in the line of efficient bracing. In the first place the connections and ends of girders and beams and the splices in columns, if required, can be readily made to develop the entire strength of the girder, beam or column. The rigid riveted connections add tremendously to the stiffness of the structure. Again the stiff bracing generally employed to transmit vibrating or static strains is capable of acting in either tension or compression and there are no loose joints to work still looser from the continual shaking, which the building has to undergo. The success or failure of a steel structure carrying moving machinery is largely due to the skill or lack of it which the designer displays in providing efficient and direct systems of bracing to take up the vibrations set up by reciprocating or unbalanced parts. There is something more than the mere static loads to be provided for and experience has taught that high factors of safety must be used as well as stiff bracing and rigid connections. We have found that there is no particular difficulty in putting machines, shafts, large mill engines or rock house engines up in a building 30 or 40 ft. from the ground if these principles are borne in mind. This often enables us to dispense with the services of a special engineer to look after the engine. Besides, there may be many indirect savings in belting and shafting and other advantages to be obtained by locating the engine well up inside of the building and close to the work. In general, I think we may assume that the steel building for mining purposes will soon come into universal use, and be found as readily adapted to special requirements as has been found in the case of manufacturing plants. The advantages in the line of lessened fire risks, durability, maintenance, light, stiffness and adaptability are so plain that no observing or progressive mining man can afford to be behind the times in the matter of steel construction.

In the iron country, particularly on the Gogebic and Mesaba ranges, quite a start has been made in the way of building steel gallows or head frames. More of them are sure to follow.

IMMENSE STEEL DAM BEING CONSTRUCTED.

While in many cases the first cost of the steel building will slightly exceed the cost of a similar structure in wood, it is maintained by parties who have put in equipment in both cases that there is little difference in the total final cost. Any excess of first cost is offset many times by the other advantages which we have enumerated. In the last two or three years many more or less new uses of steel have been found. In the copper country many large self-supporting brick-lined smokestacks have been built. Steel frame slime tables with concrete tops have been introduced and found to work successfully. Large steel cylinder drop shafts have been sunk through 75 ft. of sand to solid rock and filled with concrete to form a solid foundation for stamp heads. A large underground pump chamber is being lined with sets of I beams lagged with corrugated iron arches and concrete. Extensive steel coal handling machinery has been put in. Perhaps the most notable of all new departures is the new steel and concrete dam now under construction for the Atlantic and Baltic mining companies at Redridge. This is by far the largest steel dam ever constructed. It is absolutely novel in that it has a concrete base with inverted V-shaped superstructure of steel bents covered with boiler plates so designed that it acts as a gravity structure to resist overturning moments due to hydrostatic pressure. Besides having all the elements of stability necessary in a well designed masonry dam, it has many elements of safety not possible in the masonry dam, chief among which is the fact that the entire steel structure, 472 ft. long and from 30 to 74 ft. high, may be conceived to act as one long girder from end to end. A masonry dam consists of many thousands of separate pieces more or less perfectly cemented together with mortar. On the contrary, the steel dam will be riveted together so as to form practically one huge million-pound mass of steel anchored into a concrete base, making one unified and inseparable structure.

WITH THE COAST SHIP BUILDERS.

At the Risdon Iron Works, San Francisco, a steamer, to be used for fishing purposes, is building for L. D. Baker of Boston. Usually sailing vessels are used for this industry, and the new steamer, which is to be known as the Kingfisher, is therefore to be regarded as an innovation. The steamer's dimensions are: Length, keel, 126.8 ft.; length over all, 138 ft.; breadth of beam, molded, 24 ft.; depth of hold, 13.5 ft.; draught of water, loaded, 13 ft. The hull will be subdivided by four bulk heads. The motive power will consist of triple expansion engines, having cylinders of 14, 22 and 36 in. diameter and 24 in. stroke. Steam will be supplied by a Scotch boiler, 13 ft. 6 in. in diameter and 10 ft. 6 in. long. The vessel will cost $75,000.

On Thursday of this week the Harlan & Hollingsworth Co., Wilmington, Del., launched the Mallory line steamship Denver. The vessel is 387 ft. long and is the largest ever constructed by the Wilmington firm.

Another of the torpedo boats, the Tingey, was launched at the yard of the Columbian Iron Works, Baltimore, Md., a few days ago. The Tingey is designed for a speed of 26 knots. She is 175 ft. long, 17 ft. wide and 5 ft. draught. Her displacement is 165 tons. The hull is subdivided into nine water tight compartments.

The steamship Spokane, one of the finest vessels ever built for the merchant service, was launched last Saturday at the Union Iron Works, San Francisco. The vessel was christened by Miss Maud Lavinia Wadsworth of Seattle, sister-in-law of President J. D. Farrell of the Pacific Coast Steamship Co. The vessel is thoroughly modern in fittings and will be used in the Puget Sound and Alaskan trade.

Another of the Clyde line steamers, the Apache, was launched at the Cramp works, Philadelphia, on Saturday last. The vessel is 303 ft. 3 in. long, 46 ft. wide, and is designed for a speed of 15 knots.

A new passenger steamer, the Majestic, was launched at the Everett ship yard, Everett, Wash., recently and towed to Seattle to have her boilers fitted. She will return to Everett after her boilers are installed to have her cabin work finished and her pilot house put on. She is being built for the Thompsons of Seattle and will be used in the Puget Sound passenger service.

A passenger and freight propeller, now being built at the Port Clyde Marine Railway, Port Clyde, Me., will be named Mineola. She is to run on the line between Rockland and Portland, making daily trips in cennection with the Merryconeag. The boat will carry 150 passengers on her regular route, while her license for excursion parties will be for 400 persons. Following are the dimensions: Length over all, 123 ft.; beam, 24 ft.; depth, 8 ft. Her frame is of oak, substantially fastened, the planking and deck beams being made of hard pine. The vessel will be fitted with a compound engine of 400 I.H.P. and will have a speed of 16 knots. Her boiler will be 11 ft. in diameter and 13 ft. long. She will be piped throughout with copper and brass and will have a patent steam windlass. The machinery is furnished by the Portland Co., Portland, Me.

A five-masted schooner which John M. Brooks of East Boston is building will exceed in point of tonnage and capacity any schooner ever built, not excepting the giant six-masted schooner Eleanor A. Percy, which is now the largest schooner afloat. She will be built for Capt. A. C. Crandall and others of Boston. She will be 340 ft. over all, 300 ft. length of keel, 49½ ft. beam and 30 ft. depth of hold. Her gross tonnage will be 3,500 and her net tonnage 3,200. The extreme length of the Percy is 348 ft., or 8 ft. longer than the five-master. The Percy's gross tonnage is 3401.96 or 100 tons less than the five-master's will be. The five-master will have three flush decks, the poop being 8 ft. deep. She will have steel belts on the floor and top timbers, with diagonal iron straps extending the entire length. Steam will be used for heating purposes and for hoisting sails and operating pumps, and she will be lighted by electricity.

ANOTHER EXPERIMENT WITH THE BELLEISLE.

The much battered Belleisle is to undergo another pounding and this time some very valuable information is likely to be obtained. For her next trials 4-in. Krupp armor will be fixed on her port side, while on the starboard side she will carry 6-in. Krupp armor identical with the Drake's plates. These plates will run along the lower deck for some distance both before and abaft the redoubt. The old flat unarmored deck of the Belleisle is being removed and a 2-in. turtle back will be substituted. This will reinforce the 4-in. and 6-in. plates in places: elsewhere it will be behind unprotected sides, as the ship will be submerged sufficiently for the old belt to be under water. This will afford a very valuable experiment. The virtue of deck protection, pure and simple, will also be tested. As there are several hundred cruisers similarly armored in existence, the test will doubtless prove of great value.

TO SUCCEED ADMIRAL BOWLES AS SECRETARY.

At a special meeting of the council of the Society of Naval Architects and Marine Engineers, held in New York on the 29th inst., Naval Constructor Washington L. Capps was elected to the office of secretary and treasurer, Admiral Francis T. Bowles, the former secretary, having resigned when becoming the chief of the bureau of construction and repair. Admiral Bowles is still a member of the council and of the executive committee of the society. Constructor Capps was the secretary for several years after the organization of the society and is thoroughly familiar with the duties of the office.

ITEMS OF GENERAL INTEREST.

After writing off 11,556,348 marks for depreciation the Hamburg-American Packet Co. has declared a dividend of 10 per cent.

The French Minister of Marine, M. De Lanessen, is said to have ordered the construction of twenty additional submarine boats.

The White Star liner Celtic was launched at Harland & Wolff's, Belfast, on Wednesday of this week. She is the largest vessel in the world, her tonnage being in excess of that of the Oceanic.

Lieut. George R. Clark of the navy, coming from the hydrographic office, Washington, has just been placed in charge of the Cleveland branch office, succeeding Lieut. Hayward, who was ordered to sea a short time ago. The Cleveland office was favored a day or two ago by a visit from Commander C. C. Todd, hydrographer of the navy, who is visiting all of the branch offices on the lakes.

Col. S. M. Mansfield, the officer in charge of the United States engineer's office at Cleveland, has been transferred to New York. Col. Mansfield lately succeeded Col. Jared A. Smith at the Cleveland post. Col. Mansfield has been assigned to duty on the board of engineers at New York. He will be succeeded at Cleveland by Maj. Dan C. Kingman, now on duty at Chattanooga, Tenn. During his brief stay in Cleveland Col. Mansfield had become quite popular.

Princeton and Yale debated last week the following question: "Resolved that a system of subsidies, other than the present mail subsidies, should be adopted by the United States to encourage our ship building and ocean carrying trade." Yale held the affirmative and Princeton the negative. The decision of the judges was unanimously in favor of Princeton. Yale clearly showed the necessity for a greater merchant marine, but was not held to have shown the benefit of a subsidy.

An official notice from the Buffalo office of the Erie & Western Transportation Co. (Anchor line) announces that Mr. J. C. Evans has been appointed general western agent of this company. In addition to the duties of the Chicago agency, Mr. Evans will, under direction of the eastern and western managers in their respective departments, have general charge of the business of this company west and southwest of Chicago, furnishing on application all rates and information that may be required. His address will be No. 1 North Clark street, Chicago.

James Gordon Bennett's new steam yacht, built on the Clyde, has given satisfaction on her trial trip. She shows a mean speed of 19½ knots and handles admirably. She has twin screws and 6,500 H.P. The vessel will be completed in May. She is of 2,800 tons, has a straight stem, a storm deck fore and aft, a single huge funnel, with one mast abaft it, and one square yard for signaling. The interior arrangements are unique. She has no bowsprit, but a feature at the stern and bow is large owls with electric eyes. The anchors are stockless, like those used on merchant steamers, the shaft being drawn into the side of the ship. The hull is highly polished.

The Townsend & Downey Ship Building & Repair Co. of New York are constantly making improvements in their works at Shooters Island and they now have an outfit of pneumatic appliances for repairs to steel and iron vessels that includes tools for riveting, caulking, drilling and in fact everything necessary in a modern plant of this kind. The equipment for work on wooden vessels has been improved on a similar scale. For operation by night the works are provided with arc and incandescent lights. The large marine railway recently constructed at this plant by H. I. Crandall & Son of East Boston has proven highly successful. It is 375 ft. extreme length and of 4,000 tons capacity.

Secretary Long has announced his final decision in the controversy over the construction of the League Island dry dock. If the present contractors, the Atlantic, Gulf & Pacific Construction Co., do not accept its provisions the secretary will make other arrangements for the construction of the dock. The original contract with the company for building the timber dock was $782,600. The second board that passed on the question of the increase in compensation for building a stone and concrete instead of a timber dock allowed the contractors $350,992 additional, bringing the total allowance for the stone dock up to $1,133,592, which is about $40,000 less than the limit fixed by congress.

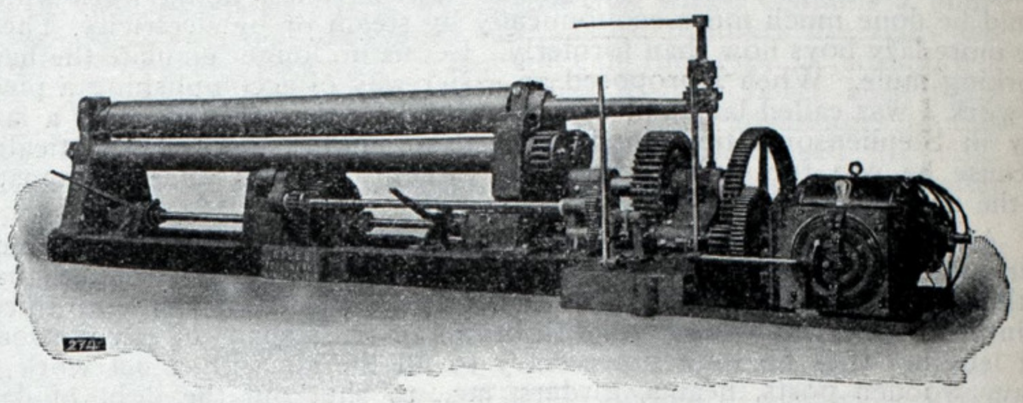
CRANES FOR SHIP YARD USE.

The Fore River Engine Co., which has been engaged in ship building at Weymouth, Mass., for some time past, but has lately built up a very large plant at Quincy, has contracted with the Wellman-Seaver Engineering Co. of Cleveland for a crane service over their ship building berths. This construction will be of steel throughout and will consist of a steel framework, which will carry two pairs of runways over each ship, on which will be operated small electric cranes of about 5 tons capacity, so that instead of one cantilever gantry serving two ships while under construction, as is the case in most ship yards, each berth will have two cranes for use during the whole time of the construction of the ship. These cranes will be designed for a very high speed, so that the work of putting the materials in place during the building of the ship can be performed with the greatest possible saving of time. The Wellman-Seaver Engineering Co. has also contracted with the above company for a fitting-out crane of an entirely novel design. This will be an electric traveling gantry wharf crane, with a folding jib, so that the crane can be moved to its place alongside of a ship, the jib lowered to its place, and the machinery or other material taken out of, or put into the ship as may be desired. This crane has two trollers, one of 50 tons capacity and one of 25 tons. There is also a lifting tackle of 10 tons capacity attached to the end of the jib, which may be used for putting masts or smoke stacks into the ship. It is believed that this crane will prove to be a very useful tool for a ship building plant.

Scott's Coast Pilot, revised for 1901, has just been issued. This addition, the sixth, contains several valuable improvements over old issues. It is a publication especially valuable for young men who are seeking a master's position on the great lakes. The book may be had from the Marine Review for $1.50.

ELECTRICALLY DRIVEN BENDING ROLLS.

These rolls are solid wrought-iron forgings arranged in pyramid form, and have a capacity for bending plates up to 12 in. in width and ⅝ in. thick. The lower rolls are geared together while the upper or bending roll is revolved by the friction of the plate in passing through. It is adjustable by power to suit the thickness of the plate and the radius to which it is to be bent. It has a hinged bearing at one end, which may be turned down out of the way, while the other end has a long shank extending to



a third support, which retains the roll in position for the removal of rings or flues. This will be found a great advantage in boiler and other shops where plates are to be bent to a complete circle. Midway between the housings a set of supporting rollers are placed to give additional stiffness to the lower rolls. For very long machines additional sets of rollers are added.

The machine is firmly tied together by a heavy cast iron sole plate. It is very strongly geared and all parts are made stiff and substantial. Suitable levers and clutches are conveniently placed for the quick and easy control of all the operations. The machine is driven by an 18 H.P. reversible, constant-speed Bullock motor. For controlling the motor, an automatic rheostat is used to prevent the operator from throwing on the full current too quickly and burning out the motor. The field consists of a circular yoke of special steel. While particular attention has been given to a reduction in weight, it has not been at the sacrifice of efficiency. The pole pieces, built up from soft sheet steel of the highest magnetic quality, are securely bolted to the yoke. The shape of the punchings are such as to produce a saturated pole face, and this feature, coupled with carefully proportioned windings, is largely responsible for the sparkless operation of the motor, and is a feature greatly appreciated by engineers. The field coils are machine-wound and carefully insulated. The shunt and series coils of compound wound machines are separately wound. The coils are slipped over the pole before it is bolted to the yoke, and, should it be necessary, are readily removed. The armature core is built up from thin, carefully-annealed sheet steel, possessing a high magnetic permeability. These discs are again annealed and then japanned. They are mounted upon the shaft and held firmly together by malleable iron end plates.

The windings, which are let into slots provided in the periphery of the armature core, are made of either copper bars or wire as best suits the requirements. The coils are machine formed, and after being formed are thoroughly insulated with mica and other high-grade insulations. They are then baked in steam heated forms while under pressure, which removes all moisture and produces a perfect and very compact coil. The result is a coil that is less liable to be injured than when produced by the ordinary method and one which requires no further insulation when placed in position on the core. The coils of armatures are held in position by wedges of hard, thoroughly dried wood, driven into notches provided near the top of the slots. The commutators are built from drop forged bars of pure lake copper with selected mica insulation. They possess great durability and have an exceptionally even wearing surface for the brushes.

The brush holder is simple and highly efficient, giving absolutely no trouble. It is of the reaction type. No adjustment of the brushes is necessary, and when they are once set the motor will operate in either direction without sparking and under all variations of load. The machine is made by the Bullock Electric Mnfg. Co., Cincinnati.

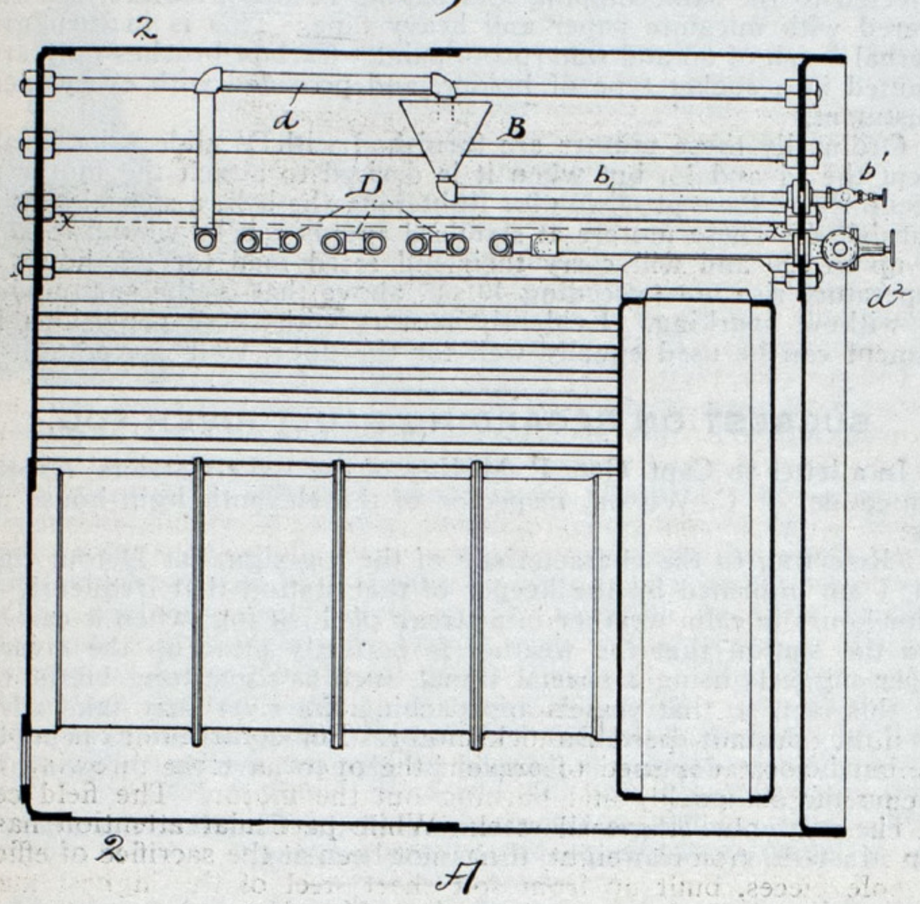
FIFTIETH ANNIVERSARY.

A half century of great progress under clean and liberal business methods stands to the credit of the American Steam Gauge Co. of Boston, a concern known to steam users in every corner of the country. The company has just celebrated the fiftieth anniversary of its organization. When the American Steam Gauge Co. was organized in March, 1851, the business consisted exclusively of the manufacture of steam gauges with Bourdon springs under the United States rights of the patent of M. Bourdon of Paris. They were the original, and for many years thereafter the only manufacturers of these gauges in the United States. From time to time, new specialties have been added to the product. To give the trade a more accurate idea of the extent and scope of the entire business it has been decided to adopt a name better suited to the present output, and hereafter the title will be American Steam Gauge & Valve Mnfg. Co. Among the most noted specialties manufactured by this company, in addition to its well-known gauges for all purposes, is the Thompson improved indicator, which has been adopted by the United States and foreign navies, and by all the principal universities and technical institutions, as well as by the leading engineers and engine builders, and received the highest award at the Paris exposition. Another and one of its principal specialties is the American patent pop safety valve. Under this title are the American, board of trade, navy and United States marine pop safety valves; also American, special inspectors and compound lever patent stationary valves; yacht, portable, farm engine, fire engine, locomotive (plain and muffled), steam heating, house heating, cylinder relief and water relief, and the underwriter patterns of water relief valves. The underwriter valves are now used by fully 90 per cent. of the manufacturers of underwriter pumps. The company also manufactures a full line of standard appliances for measuring, recording, indicating and controlling steam, air, gas, ammonia and other pressures. A new 260-page general catalogue will be ready for distribution about April 15.

FOR HEATING AND PURIFYING FEED WATER.

Mr. H. J. Reynolds, chief engineer of the Corrigan line of steamers, Cleveland, has invented and applied for patent on a mechanical device for heating and purifying feed water in boilers, which has been used in a number of marine and stationary boilers during the past year with very

Fig. 1.



satisfactory results, preventing the formation of new scale and removing old scale, with a consequent reduction of fuel bills. The object of the device is the heating of feed water and the removal of the greater part of the impurities contained therein before the water is discharged into the boiler. The device consists of the combination of an open top receiver supported in the steam space in the boiler, and having a valve-controlled discharge pipe connected with its lower end and extending outside of the boiler, a heating pipe in the boiler located preferably below the normal water line and having its outlet above and in position to discharge into the receiver, and having in its inlet end, outside of the boiler, a blow-off cock. In the drawings, Fig. 1 is a longitudinal sectional elevation of a boiler equipped with the invention. Fig. 2 is a transverse sectional elevation on line 2—2 of Fig. 1, and Fig. 3 is a plan view of the heating pipe. Referring by letters to parts shown, A indicates a boiler which may be of any suitable construction. B represents the feed water receiver, which, in the best construction, is in the form of an open-mouthed funnel. It is located in the steam space in the boiler, above the water line x—x, with its open top as near the top of the boiler as convenient. A discharge pipe b, connected with its lower tapered end, is extended out through the boiler wall and is provided outside the boiler with a blow-off b^1. The heating pipe D D, which consists of a plurality of coils or convolutions, is located in the boiler, and preferably below the water line, wherefore it is submerged in the hot boiler water. The discharge end d of this heater pipe is extended up and over the receiver B, wherefore the water which is forced through the latter is delivered into this receiver. The inlet end of this heater pipe outside the boiler contains a check valve d^2; and, between this chack valve and the boiler wall, a blow-off cock d^1 is connected with the pipe D.

Fig. 2.

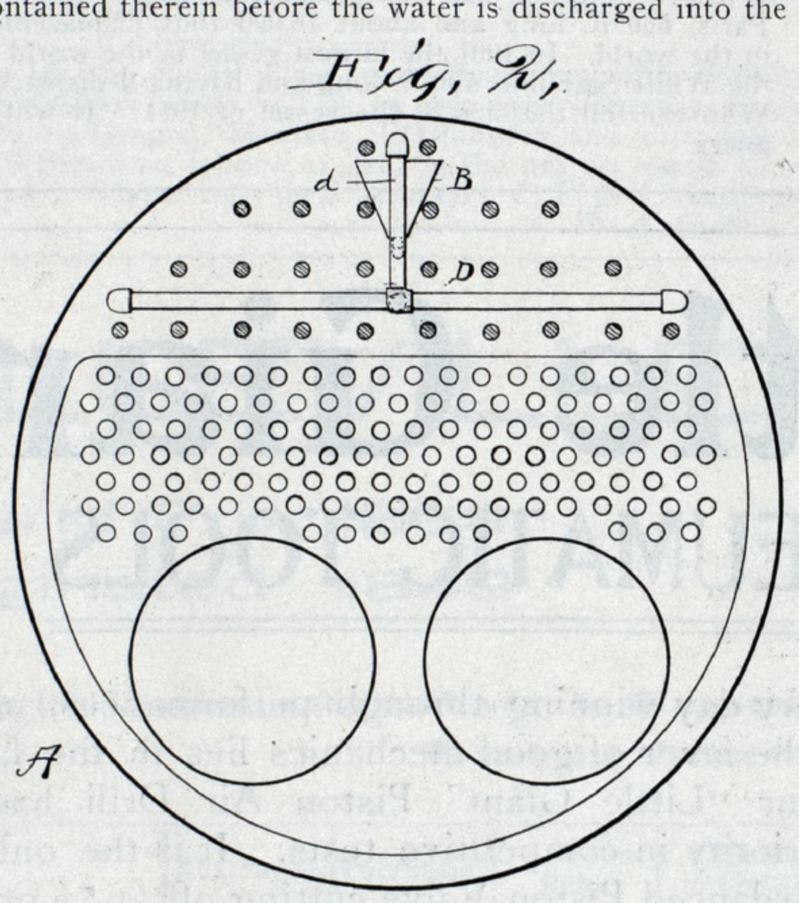
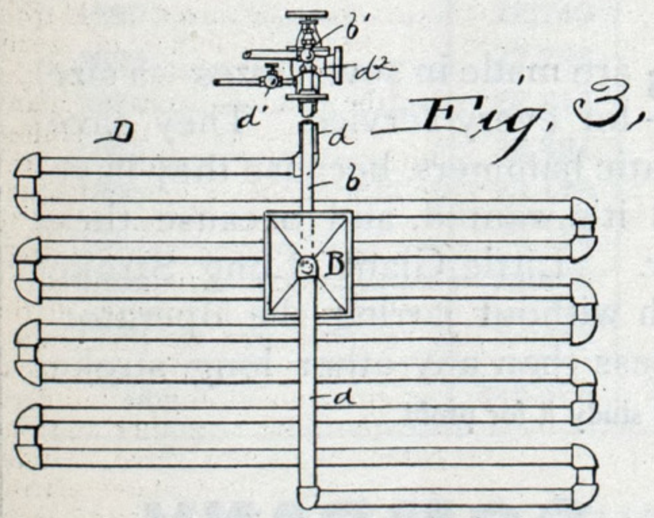


Fig. 3.



In the operation of the device the water, forced through the pipe D, is heated so that when delivered in the receiver B it is at nearly the temperature of the boiler water. The feed water used in boilers ordinarily contains impurities held in suspension, and a very considerable quantity of impurities which do not separate therefrom until the water is heated. These impurities last referred to, together with the impurities which the water when cold holds in suspension, will settle to the bottom of the receiver B and the purified water will flow over the edges of said receiver and mingle with the boiler water. At suitable intervals the impurities which have settled to the bottom of the receiver B may be blown out by opening the blow-off cock b^1. In like manner such impurities as may have settled in the heater pipe D may be blown out by opening the blow-off cock d^1.

Following is analysis of impurities removed from feed water used in the Crystal Falls mine at Crystal Falls, Mich., by this device: Iron, 51.77 per cent.; phosphorus, .493; silica, 3.27; manganese, .37; alumina, 3.12; lime, 5.85; magnesia, 1.91; sulphur, .157; organia and volatile, 9.56.

Further particulars of the device may be had from H. J. Reynolds, 721 Perry-Payne building, Cleveland.

TRADE NOTES.

On Tuesday last the Atlantic Works, Incorporated, of Philadelphia shipped one of their bevel band saw machines to Rodermond Bros., operating the Tomkins Cove Marine Railways, Tomkins Cove, N. Y.

The Eagle Oil & Supply Co., No. 104 Broad street, Boston, Mass., has issued a catchy little folder in the shape of a first-class railway ticket, each coupon advertising their cylinder and engine oils, standard boiler compound, holdfast belt dressing or Solarine metal polish. The idea is well conceived.

Andrew Philp's Sons Glasgow Iron Works, 29 West street, New York, has issued a very attractive calendar. The firm are manufacturers of marine and stationary engines and boilers. The calendar bears pictures of the steamers Monmouth and Rescue, the machinery of which was designed by Horace See.

A new 1901 pattern Skinner chuck with flush screws, either independent, universal or combination, and with either two, three or four jaws, and any style of jaw, has been placed upon the market by the Skinner Chuck Co. of New Britain, Conn. An illustrated catalogue will be furnished upon application.

A circular dealing with a new process for restoring sails comes from the Neptune Mildew & Water Proofing Co., Jersey City, N. J., preservers of sails, tents and awnings. This company claims that a sail once cured by its process will not mildew until worn out. The process is stated to be a positive preserver of canvas.

The Sprague Electric Co., 527-531 West Thirty-fourth street, New York, has issued a beautiful catalogue devoted to the Lundell fan motors. The frontispiece is a picture of the real north pole, a Lundell motor which has frozen the atmosphere stiff about it. The book is excellently illustrated with pictures of fan motors, suspended fan motors, column fan motors and other types made by the company.

With many firms it is customary to send out a calendar for the year. The Bullock Electric Mfg. Co. of Cincinnati is sending out calendars by the month. The one for April has the jester in caps and bells sitting down in tailor fashion, a most appropriate design for April fool. The printing is excellent. The reverse of the card gives a list of the company's generators and motors for direct and alternating currents.

Mr. A. L. Schultz, formerly president and general manager of the Schultz Bridge & Iron Co., Pittsburg, has been appointed to take charge of the operating department of the American Bridge Co., covering the Pittsburg district, which comprises the Keystone, Pittsburg, Schultz and Shiffler plants at Pittsburg; the wrought iron plant at Canton, O.; the new Columbus plant at Columbus, O., and the Youngstown Bridge Co. plant at Youngstown, O.

Offices of the Process Copper & Brass Co. have been moved to 42-44 Hudson street, Jersey City. The claim of this company is that it casts pure copper solid and free from blow holes. The characteristics of copper thus treated is that it is purified, strengthened and fendered absolutely homogenous. The tensile strength of the copper cast by this process is 30,000 lbs. to the square inch. The company claims that the discovery of a blow hole in any of its castings is yet to be made.

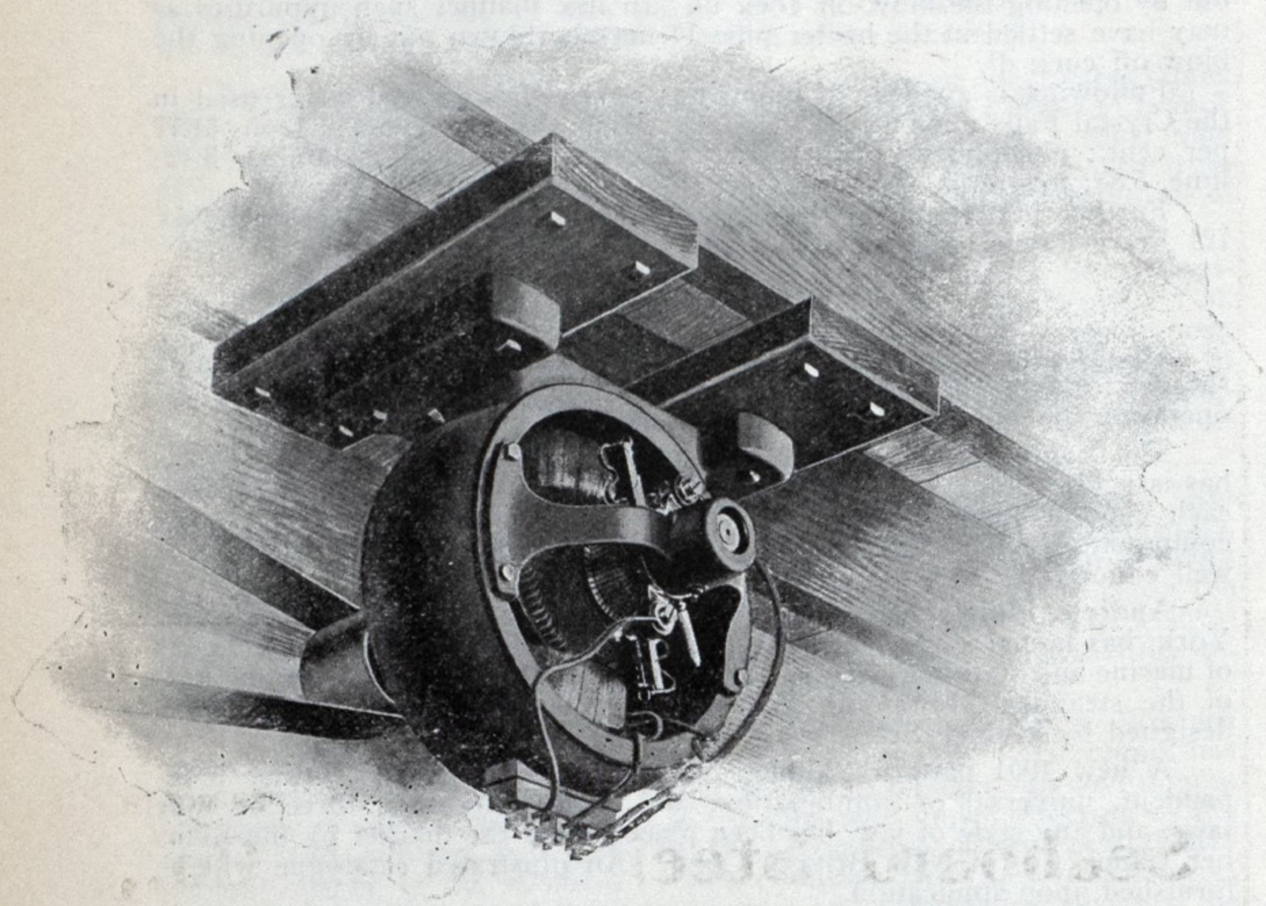
A business announcement from the Risdon Iron Works, San Francisco, indicates a determination on the part of that concern to reach out on the Pacific coast for enlargement of its business in ship building and ship repairing lines. Departments of the works include machine, electrical, blacksmithing, boiler, refrigerating, coppersmithing and joiner work. The name of Robert Curr, formerly of Cleveland, appears as superintendent of naval construction and H. C. Tabrett superintendent of marine engineering.

A report from the Seidler-Miner Electric Co. of Detroit is to the effect that in supply lines the demand is very active just now, especially from the marine trade. They are now giving attention to the wiring system of the Whitney and other new steamers at the works of the Detroit Ship Building Co., and have just begun work on a very large contract connected with the water works and electric light plant that are being erected at Mackinaw, Mich. A contract for the electric lighting of the new Wayne county court house is about completed.

A dispatch from Montreal announces that the Dominion government has granted a charter to E. V. and F. H. Clergue, F. S. Lewis and R. N. Douglas of Philadelphia to establish a Dominion Lloyds. The capital is $5,000,000. The hight rates of insurance charged on cargo and vessels on the St. Lawrence route has led to the government deciding to grant the charter. It is understood that the government has declared that every possible help shall be given to the new concern.

A NEW BI-POLAR STURTEVANT MOTOR.

In the development of the bi-polar type of motor as specially adapted for direct connection to centrifugal fans, the B. F. Sturtevant Co. of Boston, Mass., has gradually been led into the manufacture of the same general type as independent motors. They, of course, possess the inherent feature of great range of speed due to the bi-polar design. In the accompanying illustration is shown a special arrangement of one of these machines, which are built in small sizes, ranging from ¼ to 5 H.P.



The frame or magnet ring is usually of cast steel to support the armature bearing cradle. The stand or base is an entirely separate casting, in which the motor is placed and secured by set screws. Evidently the motor itself may therefore be turned to any angle, while the bearing cradle is maintained in a horizontal position. The bearings are of the ring-oiling, self-aligning type, the bearing sleeves being made of hard composition. This feature of having both bearings mounted in one and the same casting insures absolutely perfect alignment, while this feature combined with the ring-oiling, self-adjustment design insures the minimum friction resulting from rotation of the armature. Crucible steel is employed in making the shaft. The armature itself is of the ordinary toothed drum type, the coils being wound in slots insulated in a most thorough manner. The commutator is built up of drop forged segments of pure lake copper mounted in composition shells and insulated with pure amber mica, carefully selected. After being wound the whole armature is thoroughly saturated with an insulating compound and baked at a temperature of from 150° to 175°. This renders the armature oil and water proof and prevents any liability of a breakdown.

The field coils are of durable cotton covered wire, which, after being subjected to the same dipping and baking as the armature, are carefully covered with micanite paper and heavy tape. This is in turn given an external finish of oil and waterproof paint. Carbon brushes only are used, mounted in a socket type of holder, and provided with every facility of adjustment.

Ordinarily these motors are furnished with V slide rails in all sizes except the ¼ and ½, but when it is desired to attach the motor to wall or ceiling and have provision for tightening the belt, a special sliding base is furnished. These motors at standard speeds can be wound to any voltage up to 600 and will carry their full rated load for ten hours with a temperature rise not exceeding 40° F. above that of the surrounding air, and without sparking. Evidently motors with these provisions for adjustment can be used equally well for the floor, wall or ceiling.

SUGGESTION REGARDING SAULT RIVER FOG.

In a letter to Capt. Geo. P. McKay of the Lake Carriers' Association, Commander J. C. Wilson, inspector of the eleventh light-house district, says:

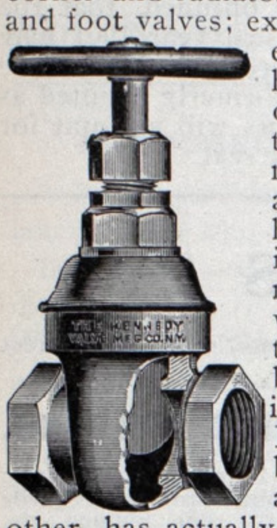
"Referring to the characteristic of the fog signal at Detour light station, I am informed by the keeper of that station that frequently vessels lie for hours in calm weather in a streak of thick fog, when it can be seen from the station that the weather is perfectly clear up the river. The keeper suggests using a special signal, such as three long blasts, to indicate this fact, so that vessels approaching the river may take advantage of it if they deem it desirable. This suggestion strikes me as being a good one, but before adopting it I would be glad to have the opinion of vessel men on the subject."

The matter will have the attention of the Cleveland members of the Ship Masters' Association at their next meeting.

It is both interesting and instructive to note the gradual growth of the ocean liner. In the year 1881 the largest steamer in the world was the City of Berlin, now the Meade of the United States transport service. She is 520 ft. long and has a displacement of 8,000 tons. In 1891 the City of Paris, 560 ft. long and about 16,000 tons displacement, was the largest in the world. In 1901 the largest vessel in the world will be the Celtic of the White Star line, 700 ft. long and having a displacement of 36,000 tons. Who can tell the size of the vessel of 1911? It will not do to hazard a guess.

KENNEDY VALVES.

Almost every kind of valve imaginable for water, steam, gas, oil, ammonia, acids, etc., is described in printed matter sent out by the Kennedy Valve Mfg. Co. of No. 75 John street, New York. Fire hydrants, patent indicator valves and valve indicator posts; globe, angle, check, corner and radiator valves; safety valves, swinging check, vertical check and foot valves; extra heavy valves for extreme high steam pressure; and extreme heavy pressure valves for use on pumps and hydraulic mining machinery, etc. This concern is evidently enjoying a very prosperous business. Most of the machinery at the works in Coxsackie, N. Y., was made specially for the company's use. A patent fire and indicator valve for hydrant mains, fire pumps, etc., has an attachment that shows plainly whether the valve is open or closed. It is said that even in the dark a man can tell, the moment he puts his hand on this valve, whether or not it is shut and which way to turn to open it. Serious fire damage has often occurred by reason of valves designed to be kept open, becoming closed accidentally and remaining closed unnoticed. In support of this device it is claimed that there have been frequent cases where, in the excitement of a fire, a man trying to open a valve previously opened by another, has actually closed it, or where valve stems have been twisted off by trying to open a valve in the wrong direction. The indicator attachment does not interfere with packing in stuffing box. It is all on the outside, in plain sight, not liable to injury by blows or obstruction by rust, and consists simply of an open metallic sleeve, moved up or down by a thread on the valve stem, so as to cover or uncover the words "open" or "shut," which are cast in bold relief in large letters on bonnet of valve.



The company also directs special attention to their composition wedge gate valves with solid bronze seats, either screw or flange ends, stationary or rising spindles, of which it is said: "They have a straightway passage the full diameter of connecting pipes. The gate is in one piece, is tapering or wedge shaped, and guided in the body by means of ribs or splines, which prevent its coming in contact with the seats until closed. The valve is double-faced and will bear heavy pressure on either face, and either end of valve may be used for inlet or outlet. They are especially adapted for high pressure and superheated steam."

The department of marine and fisheries at Ottawa has advertised for bids for the construction of a twin screw steel steamer of the following dimensions: Length, 210 ft; breadth, molded, 34 ft.; depth, 18 ft. The contract is to include hull, masts, rigging, engines, boilers and all other machinery.

Settlers' rates via the Nickel Plate road—Beginning with Tuesday, Feb. 12, low rate settlers' tickets will be on sale every Tuesday to and including April 30, to Oregon, Montana, Washington and all points in the Northwest. Write, wire, 'phone or call on the nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 10 April 30.

"KEEP ME AND NEVER GO BROKE."

The Bertram Oil Polish Co., Boston, Mass., reports a demand, phenomenal in its proportions, for a little advertising souvenir shown herewith. It consists of an aluminum horseshoe, in the curve of which is soldered a bright new penny of vintage of 1901. The souvenir bears the motto "I bring luck," and also the truthful statement "Keep me and never go broke." It is always simple little things like this which have the biggest vogue and the Review is not surprised that the company is receiving a heavy demand for them.

The company announces that every package of Bertram's polish, oils and paste (except 3 and 8-oz. cans) contains one of these twentieth century luck coins. They make a specialty of the marine trade, especially passenger steamers and yachts. This novel advertising specialty will undoubtedly prove a very popular pocket piece.

EXPORTS OF MANUFACTURES.

The record of exportation of manufactures from the United States in the fiscal year which ends ninety days hence is not likely to equal that of the preceding fiscal year, for three quite apparent reasons: First, the exporters engaged in commerce with the Hawaiian islands are now refusing to furnish to the bureau of statistics the statements of their exports as in former years, holding that their exports are no longer "foreign commerce" and that therefore the bureau has no authority to require the usual statements which the law authorizes with reference to commerce between the United States and foreign countries. Second, the exports to Porto Rico are now separately classified and no longer included in the general statement of foreign commerce. Three, the exports to China have temporarily fallen off one-half by reason of the unsettled conditions in that country.

The total exports to the Hawaiian islands in the fiscal year 1900 were $13,500,000, and to Porto Rico over $4,500,000, a total of more than $18,000,000. The shipments to Porto Rico in the present fiscal year show a large increase over last year, and presumably those to Hawaii have also increased; but as neither of these is included in the export figures of our foreign commerce, it is apparent that more than $20,000,000 of actual shipments from our ports in the fiscal year 1901 will not be included in the general statement of exports to foreign countries. When to this is added the further fact that the exports to China, which in the last fiscal year were over $15,000,000 in value, have been temporarily cut down one-half, it is apparent that the year's figures of exports to foreign countries will not furnish a fair or just basis for comparison or for measurement of the general growth of our export trade.

The total exports for the eight months ending with February, 1901, show an increase of more than $95,000,000 over last year, but those of manufactures alone show but a slight increase, and there is reason to believe that the recorded total of manufactures for the full fiscal year will, for the above stated reasons, fall somewhat below that of the preceding year. This is due to the fact that a large proportion of our exports to Hawaii, Porto Rico and China are manufactures, and that the apparent reduction, for the reasons above explained, in the Hawaiian and Porto Rican figures and the real reduction in the exports to China by reason of temporary conditions, therefore relates almost exclusively to the class of exports designated as manufactures. Another condition which has a tendency to reduce the total value of exports of manufactures is found in the fact that prices of manufactured articles in many cases have fallen because of the reduction in the cost of the raw material from which they were produced, and that the exportation of an equal or even greater quantity supplies a smaller figure in the statement of values by which the export movement is necessarily measured.

It is quite probable, in view of the facts above outlined, that the record of exports of domestic manufactures in the fiscal year 1901 may show an apparent reduction, though the fact that more than $20,000,000 worth of actual shipments from our ports, which were formerly counted as foreign commerce, no longer appear in these statements will account for the reduction, which will thus be more apparent than real.

U. S. Engineer Office, Customhouse, Cincinnati, O., March 22, 1901. Sealed proposals for hire of Towboat having cylinders about 14 inches diameter, with 5 feet stroke, to serve as tender for Ohio River Dredges during present season, will be received here until 2 p. m., April 26, 1901, and then publicly opened. Information furnished on application. Wm. H. Bixby, Maj., Engrs. Apr 18.